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The Questions of Salmon (*Salmo salar*) Feeding in Fresh Water and Taking of Bait[1]

By William Converse Kendall

I. Salmon Feeding in Fresh Water

THE question whether or not salmon feed during their ascent of rivers is an old one, which has given occasion for many lay arguments pro and con as well as much scientific investigation.

Much of the evidence that salmon feed in fresh water has been based upon the facts that food has been found in the stomachs of fresh-run salmon and that they will take bait or fly. One angler stated that it was "all nonsense to say that salmon, when in fresh water, live upon love," as he had found every imaginable insect, flies, beetles, worms, and spiders in their stomachs. Day said that many of those who admit that the male parr or the mending kelt will feed in fresh water, hold that salmon as a rule do not increase in weight when absent from salt water; but proof in figures is still wanting to uphold this theory as applicable to all salmon, as excreta from the vent may be seen in some, which must be remains of food which they have consumed. To him, it seems possible to divide salmon ascending rivers into two classes: first, such as will breed within a short period after their ascent, and, secondly, such as will not do so without again descending to the sea, being clean run fish. "This," he said, "raises the question whether the latter of these classes, or the clean-run salmon, may not be the feeders; whereas the breeders are more or less abstainers."

One of the earliest scientific investigations of the subject was made by Dr. John Davy, who tested the stomachs with litmus paper in order to ascertain the presence of gastric juices, assuming that, if functioning, acid would be detected.

On August 24, four salmon taken in the sea were tested about three hours after capture, when there was no solid food or liquid but only a little adhering mucus present. The reaction was negative. Again, on August 26, four others similarly taken were found to be empty, and a slight alkaline reaction obtained. August 27, September 3 and 6, two salmon and one grilse taken with a fly in fresh water had empty stomachs and the reaction was the same. However, in parr and smolts food was always present and their stomachs gave an acid reaction, the examination being made as soon as they were taken from the water. Sea trout taken with fly in fresh water, in the majority of instances, afforded results similar to those of the salmon, those containing food giving an acid reaction, but only once in forty-two trials did he get an acid reaction from an empty stomach. Brook trout gave the same result.

At Basel, some five hundred miles up the Rhine, Dr. F. Miescher-Rüsch, professor of physiology at Basel, made observations upon Rhine

[1] This article was prepared for the Jordan Anniversary number of COPEIA, but unfortunately arrived too late for inclusion.

salmon, the account of which became almost a classic. Having for four years examined the intestines of Rhine salmon, he was forced to the conclusion that the salmon, from the time they ascend the river from the sea until they have finished spawning, never take food, and that, as a rule, they do not take any food afterward. He stated that occasionally he found a small stone, a piece of a blade of grass, or a stalk of some plant, which had been swallowed. Once a tolerably large larva of insect was found in the small intestine, but entirely undigested and intact. He also decided that, with the exception of the bile, no effective gastric juice is secreted.

One exception was noted, that of a male kelt which contained two partly digested cyprinoids. The somewhat distended stomach of another male kelt contained no food, but a small quantity of a thin secretion which possessed an acid reaction. "In the majority of male fish, however," he said, "as well as in all the females of this stage, I found nothing of the kind. Necessity, which is the mother of invention, and which occasionally teaches the male salmon to eat, is probably not felt so much by the female salmon, because at the time when they begin their homeward journey to the sea (December to the beginning of February) they find a substitute-food in the numerous eggs which have not been emitted, and which often number several hundred."

On the lower Rhine an examination of 2,000 salmon by Hoek revealed only seven with remains of food in their stomachs.

In Scotland for a number of years Dr. Noel Paton conducted exhaustive research concerning the life history of salmon. The conclusion was reached that salmon not only did not, but could not, feed, owing to the fact that the stomachs underwent a functional derangement in the form of "desquamative catarrh."

This was later shown by Barton to be an error of observation. The results of the aforementioned acid tests simply indicated a well-known fact that in the stomach the secretion of hydrochloric acid normally takes place only in the presence of food or during the digestive process, and naturally would not be found in the stomach at other times. Barton proved that the "desquamative catarrh" was the result of incipient decomposition or the effects of preservatives used.

The fact remains, however, that salmon seldom take food during their ascent of rivers, the best evidence of which is that seldom is anything of the nature of food found in the stomachs of those caught, and that there is not sufficient food in the rivers to support the number of salmon that ascend them. The general absence of parasites in the intestinal tract of salmon after they have been some time in fresh water has been offered as evidence that salmon do not feed. The April number of the *American Naturalist,* 1892, contained an article, translated by Dr. C. W. Stiles from the conclusions of Professor Zschokke, to the effect that the absence of fresh water parasites in Rhine salmon shows that in this stream no food is taken by them, but that the occasional presence of fresh water parasites in the salmon of the Tay proves that food is occasionally taken in that stream, and the very frequent presence of these parasites in the salmon of the Baltic Sea shows that it is the regular custom of this fish to feed in the rivers and brackish water of that region.

The foregoing are a few of the specific observations upon which the general assumption that all Atlantic salmon practically cease to feed in fresh water is based; also, which convey some positive evidence that occasionally or in some instances food substances are to some extent taken.

On the other side of the question, as late as 1929, *The Fishing Gazette* (Vol. 83, No. 2312, Aug. 13, 1921) published a communication by R. F. Miles, which the Editor, Mr. Marston, pronounced "Interesting testimony." Mr. Miles wrote:

"Since my cricket days were over I have been a very keen angler as far as time allows, and much interested by your paper. In last week's edition came up again the old question of salmon feeding in rivers. A curious instance happened in my own experience. I was fishing a small river at Glenelg, in Inverness-shire, somewhere about the year 1888 or 1889, at the end of September.

"I was very high up the river, say seven or eight miles, where it was so narrow one could almost jump across. Fishing in clear water just below a little fall, I hooked a grilse of about 7 lb. Both I and my gillie plainly saw him eject a sea-trout ¼ lb. to ½ lb. in weight, which we picked up, scarred a good deal and, of course, dead, but quite fresh. I was fishing with worms and killed a good many salmon with worms that month, but very few with a fly.

"My opinion always has been that salmon in fresh water though they of course get poorer and more out of condition the longer they are away from the sea, feed sufficiently to avoid starvation, but directly they are hooked eject everything in the stomach, though there is usually difficulty in observing this."

But as Miescher-Rüsch remarked in connection with another subject pertaining to the Rhine salmon, "experiences gained in other rivers should not be applied to the Rhine salmon, and *vice versa*." The fact that conditions in different rivers greatly differ and that the habits of the salmon may differ accordingly, should not be lost sight of, and that generalizations from specific localities may lead to confusion.

While the basic physiological impulse to ascend fresh-water rivers is doubtless the same in all salmon, it may be modified more or less by local conditions. Or, as succinctly expressed by Gurley: "The habit of abstinence from food has many degrees and probably is strictly in direct ratio to the length of time required *ad minimum* for the species to reach the spawning grounds, and so natural selection has gradually weeded out those individuals which had the feeding impulse strong and has favored those which tend to concentrate their feeding and motor sexual functions into different portions of the yearly cycle."

I have previously suggested that with the Atlantic salmon there may be some local structural or racial differentiation, something like that manifested by some of the Pacific salmon, as shown by Gilbert. Or, there may be a correlated physiological differentiation. In fact, this is to be expected. The salmon which ascend the Rhine 500 miles or more have conditions to meet which do not obtain in the comparatively short river of Scotland or Norway. Fish which live in the Baltic and ascend the rivers of Finland or Sweden can hardly be comparable in every respect with those which

ascend the Rhine or the rivers of Great Britain. While in all the "feeding and motor sexual functions" are largely "concentrated in different portions of the yearly cycle," the degree of concentration, and the abruptness of transition from the one to the other may and probably do differ according to conditions. Furthermore, it could hardly be expected that in any case would a sudden suppression of the feeding impulses take place. The switch-board of the "nerve responsive" mechanism could hardly be expected to be under such complete automatic control. So while the breeding impulse more or less gradually becomes paramount, and the feeding impulse correspondingly subordinated to it, it may be expected that the "nerve mechanism" may for a time be occasionally excited by objects of the nature of food or having that appearance, and that this excitability more or less gradually grows weaker as the breeding time and place is approached. This seems to be in accord with the facts as indicated by the observations mentioned and by general experience, and would account for the fact that salmon occasionally eat a fish, or insect, swallow a leaf, or piece of bark, or take a bait or artificial fly. It would also perhaps account for what have been regarded as peculiar idiosyncrasies of the salmon. It also may suggest the reason why the best angling season is in the spring or early summer. It appears also from the observations cited and from general experience, statements to the contrary notwithstanding, that the salmon kelts do not abruptly begin to feed in ravenous manner, and those kelts most commonly found with food within stomachs are males. This latter fact possibly is connected with what appears to be a fact that at least some males linger longer than females in fresh water after spawning.

II. Salmon Feeding on Bait

It has occasionally been affirmed that salmon will not take bait in fresh water. However, bait fishing for many years has been, or was once, customary in rivers of Great Britain. T. Harris stated that on March 22, a fresh run salmon of 32 pounds weight had been taken on a dace four or six inches long as bait, with light trolling tackle, in the Hampshire Stour. This was the second fish killed with dace bait during the year, and in each case after fly and prawn had failed. Either three or four were killed the previous year with similar bait. The other two fish weighed respectively 11 and 19 pounds (Day, *British and Irish Salmonidae*).

E. T. D. Chambers, under the heading, "When Salmon Take Bait" (Forest and Stream, August 23, 1902, p. 147), wrote: "As almost always happens when the relative merits of salmon fishing in Europe and America are discussed, the gentleman from Galway and the writer soon fell to talking of the apparent difference in the feeding habits of the salmon of European and of eastern American coastal streams. An American angler would as soon think of fishing for sturgeon with a fly as to endeavor to take salmon in the fresh water of a Canadian river with bait. Yet I have met and talked with numbers of English anglers who appear quite puzzled at the fact that there is no bait fishing in America for *Salmo salar*, as there certainly is in the fresh-water habitat of the same fish in Great Britain. In the Irish waters fished by Mr. Mulholland—the gentleman already re-

ferred to—he tells me that the most successful baits for salmon are worms, shrimps and small spoons, the fresh shrimps being a particularly killing bait. Mr. Mulholland was very careful, too, to have me understand that European salmon take the baits above mentioned, far above tidal or salt water, or even brackish water. It is not very strange that this experience of British anglers, in taking salmon freely with bait, should strengthen the belief, which so many of them now hold, that *Salmo salar* fares sumptuously every day, whether in fresh water or salt. When worms or shrimps are carefully thrown into a European salmon pool in which the movements of the fish can be observed, they may at once be seen nosing and often swallowing the food. It is a part of the theory of Mr. Mulholland and of other British anglers who share his views as to the feeding of salmon in fresh water, that their fish expell the contents of their stomachs upon being hooked or otherwise interfered with, exactly as black bass have been observed to do when hooked in clear water."

Mr. Chambers is responsible, also, for another account of capture of salmon on bait (Forest and Stream, September 26, 1903, p. 244): "The fact that so many salmon are captured every year with bait in the British Isles is certainly a very strong argument against the theory of those who hold with Dr. Francis Day, the late Frank Buckland and others that a salmon exists in fresh water on his own fat, which has been accumulated while feeding in salt water, and that it is simply in play or in anger that he arises to a fly. It will be remembered that Major Traherne in his book on *The Habits of the Salmon,* published in 1889, declares emphatically that there can be no question as to salmon feeding in fresh water, as they greedily take real and artificial spinning baits of all kinds, besides prawns and worms, to say nothing of flies, natural and artificial: All anglers accustomed to British salmon waters are well aware of the fact that these various baits are used in them for salmon with success. There is, however, no doubt at all, that it is a very rare circumstance to take *Salmo salar* on this side of the water with bait, though the very different salmons of the Pacific are constantly so killed. This fact lends additional interest to the contents of a letter which has recently reached me from Newfoundland. The writer, Mr. W. F. J. McCormick, of Biscayne Bay, Florida, well known to readers of Forest and Stream from his long and successful camping, hunting and angling excursions in the Canadian wilderness, writes, among other things, as follows: 'One thing I have learned conclusively and positively, and that is that *Salmo salar,* the delicate aristocrat of the river, will stoop to bite at the plebian worm, a piece of fish or common pork. I took a 12½ pound fresh-run fish on a bunch of worms, stood by and saw a 21 pounder killed with the same and, last Sunday I took an 8-pound grilse on pork! Does not that upset the pet theory of their refusing food while in fresh water? I can produce a number of sworn statements besides my own support of this.'

"In England, as I have already said, nobody would be surprised at the above statement, but it is certainly very contrary to the general American experience.

"The decadence of fly-fishing for salmon in some British waters has elicited a good deal of discussion lately, and some have not hesitated to lay

it at the door of the bait fisherman, contending that the constant bait-casting is responsible for the frequent refusal of the fish to rise to the fly. If there is any foundation for this contention, it is sincerely to be hoped that nobody will attempt bait-casting in Canadian salmon rivers. Some of the British bait-fishermen for salmon scout the idea that the casting of bait has anything to do with the failure of the fish to rise to flies, and a recent writer in the FIELD advances the very ingenious theory that in the British seas a change is going on in the habits of the fish, perhaps, or possibly, in the diminution of the supply of that creature, whatever it may be for which salmon mistake our gaudy flies. The correspondent in question also draws attention to the fact that in some rivers, particularly in British Columbia, salmon are never known to take a fly at all. This is not an apt illustration, however, for the salmon of British Columbia is an entirely different fish from *Salmo salar* of Atlantic waters, whether found in the Old World or the New.

"The salmon bait-fisherman naturally claims the same indulgence for his sport that is demanded when he employs similar methods for taking trout. He admits that the fondness for the fly-rod sticks to us, that the old love clings, but claims that though it is hard to lay a favorite old weapon down even though useless, it is harder still to be denied a capture when another is at hand that will take its place."

There are other accounts of salmon taking bait in the rivers. There can be no doubt but that they do at certain times, so it is unnecessary to multiply the evidence. What bait and fly taking may signify in connection with the subject of feeding in rivers is discussed in preceding pages.

BUREAU OF FISHERIES LABORATORY, FREEPORT, MAINE.

Egg Capsule of *Scyliorhinus retifer*

By JOHN TREADWELL NICHOLS

ON March 18, 1931, the American Museum of Natural History received from Mr. F. Nagele of Nagele Bros. Fish Market, New York, the empty egg capsule of a scyliorhinid shark or dogfish, taken out

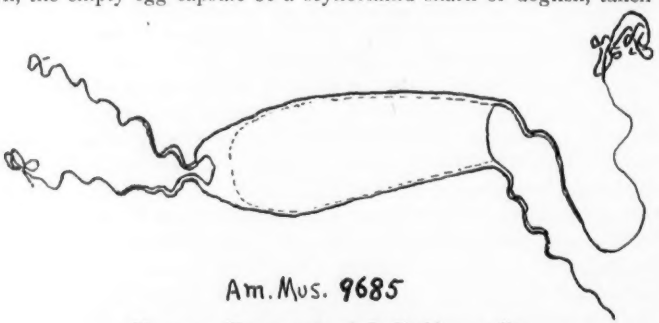


Figure 1. Egg capsule of *Scyliorhinus retifer*.

of a sea bass, said to be from New Jersey. This locality is in doubt, as Mr. Frank E. Firth of the U. S. Bureau of Fisheries tells me that most of the market sea bass this winter have come from off the Virginia coast southeast of Cape Henry, between 40 and 65 fathoms, where a winter trawl fishery has developed, and that such fish are sometimes shipped via Cape May, New Jersey. As only one such shark is known from this coast, namely the rare deep-water *Scyliorhinus* [*Catulus*] *retifer* (Garman), the egg case is presumably of that species, and may never have been described. It is elongate, more or less vase-shaped, and brownish amber in color. Length, 53 mm.; greatest width, 20 mm.; width at opening end, 14 mm.; thickness, about 8 mm. The case is catalogued as No. 9685 in the American Museum of Natural History.

American Museum of Natural History, New York City.

Fish Notes for 1929 and 1930 from Sandy Hook Bay

By C. M. Breder, Jr.

DUE to greater attention being given to collecting by small seine, as a consequence of the continued falling off of the pound net catches and a reduction in the number set, the collections brought to the New York Aquarium from Sandy Hook Bay during 1929 and 1930 presented a slightly different assortment of species than formerly. Some of the more interesting notes are listed below.

1. *Petromyzon marinus* (Linnaeus)

Two large examples were taken in the pound nets, one on June 5, 1929, and the other June 3, 1930.

2. *Pteroplatea micrura* (Schneider)

A single small specimen; August 28, 1929.

3. *Synodus foetens* (Linnaeus)

This species has become notably more abundant during the last two years, appearing in fair numbers in the late summer. Between September 3 and 30, 1930, many were collected, some as long as 150 mm.

4. *Leptocephalus conger* (Linnaeus)

A single medium-sized specimen; October 8, 1930.

5. *Lucania parva* (Baird and Girard)

Several were collected in company with *Fundulus* and *Cyprinodon* in the tidal part of the Schrewsbury River on June 3, 1930. A new species for the list of Bay fishes.

6. *Hippocampus hudsonius* (De Kay)

One each was taken from pound net leaders on June 18 and 28, 1929,

and two in midsummer, 1930. In this connection it is noteworthy that after an almost complete absence for three years at Sayville, Long Island, in the fall of 1930 this species appeared in large numbers. For the last few years it has been generally rare locally but now seems to be reappearing in considerable force.

7. *Mullus auratus* (Jordan and Gilbert)

Recorded for the first time in 1928, this species since then has been steadily increasing and along with *Synodus* was taken in numbers in 1930, although preceding it in time of year, the first appearing on July 9.

8. *Chaetodipterus faber* (Broussonet)

A single large example (about 1½ feet); October 8, 1930.

9. *Chaetodon ocellatus* (Bloch)

A single small specimen; August 28, 1929.

10. *Gobiosoma bosci* (Lacépède)

Two specimens from the lower Schrewsbury; June 28, 1929. A new record for these waters.

11. *Astroscopus guttatus* (Abbott)

Two very small examples were taken on June 28, 1929; one on June 18, and one on September 3, 1930. None was longer than 25 mm. A new record for Sandy Hook Bay.

12. *Opsanus tau* (Linnaeus)

This species spawns abundantly in the lower reaches of the Schrewsbury River. Mr. W. Bennett of the Aquarium staff counted the eggs in two "nests" on June 3, and found 1441 and 1029 respectively. The number of females involved is uncertain.

13. *Rissola marginata* (De Kay)

A single typical specimen, 203 mm. long, was taken on July 9, 1930, from a lobster trap near the mouth of the bay. This specimen, a new record for this bay, lived for about two months in the Aquarium. Although provided with sand, it exhibited no efforts at burrowing, which is a reputed habit of the species.

The finding of *Lucania parva, Gobiosoma bosci, Astroscopus guttatus* and *Rissola marginata* brings the list of species definitely recorded from Sandy Hook Bay to 120.

NEW YORK AQUARIUM, BATTERY PARK, NEW YORK CITY.

An Account of the Fishes Dredged by the Albatross II Along the Continental Slope South of New England in February and March, 1929[1]

By William C. Schroeder

THE United States Fisheries vessel *Albatross II* made several otter-trawl hauls along the continental shelf south of New England, on a hydrographic cruise during the end of February and early March, 1929. The fishes taken in these hauls are of interest, for they include several rare species, the young of several common fishes, and the adults of one important food fish, the winter habitat of which has only recently been found.

Ever since a remarkable catch of fish and other marine animals was recorded from there by Goode (1880),[2] it has been believed that a rich fish fauna exists along the general vicinity of the 100-fathom contour off southern New England. Subsequent catches made by the *Blake, Albatross,* and *Fish Hawk,* recorded by Goode and Bean (1896)[3] have substantiated this belief.

Since the collections listed by Goode and Bean (1896)[3] were made, little systematic dredging had been done along the continental slope between southern New England and Chesapeake Bay until 1920, when two hauls were made in the offing of Delaware Bay late in February (Lat. 37° 50′ N., Long. 74° 02′ W., and Lat. 39° 35′ N., Long. 72° 02′ W.), while the *Albatross* was enroute from Baltimore to Boston.[4] Among the fishes caught in each of these hauls were the spiny dogfish (*Squalus acanthias*) and the silver hake (*Merluccius bilinearis*), both of them warm water species which forsake the Gulf of Maine and the shore waters south of New England, in winter. It seemed not at all improbable that further trawling in this region might reveal the winter habitat of some of our other food fishes which disappear in the fall and do not return until spring, especially as the bottom temperature at the 100-fathom contour at the coldest part of the year is about 10°C., or even somewhat higher, and as there appears to be an abundance of food—crustaceans, molluscs, worms, etc. Within the past few years a winter otter trawl fishery of great magnitude has sprung up in the shore waters between Cape Henry, Virginia, and Cape Hatteras, North Carolina, and large numbers of seabass *(Centropristes striatus),* butterfish *(Poronotus triacanthus),* croakers *(Micropogon undulatus),* weakfish *(Cynoscion regalis),* as well as other species in lesser amounts, have been taken between November and April. Any information concerning the fish fauna in this region should therefore prove of interest.[5]

[1] Published by permission of the U. S. Commissioner of Fisheries.

[2] George Brown Goode, Proc. U. S. Nat. Mus., 3, 1880: 337-350; 467-486.

[3] George Brown Goode and Tarleton H. Bean, Oceanic Ichthyology, Mem. Mus. Comp. Zool., 22, 1896, 553 pp. Also published as Smithsonian Contributions to Knowledge, 30, 1895 (1896), and as Spec. Bull. No. 2, U. S. Nat Mus., 1895 (issued June, 1896).

[4] In November, 1912, experimental hauls were made by an otter trawler along the continental shelf south to southeast from New York. Species of interest that were caught were recorded in a paper, "Fishes From Deep Water Off New York," by John T. Nichols, in the American Museum Journal, 13, January, 1913: 43-44.

[5] We look forward to lists of the fishes taken on the slope off New York by Mr. Wm. Beebe on the Arcturus in 1925, and since then.

Data on the *Albatross II* hauls for 1929, are as follows:

Station 20,399: February 27, 1929; Lat. 39° 23′ N., Long. 72° 18′ W.; depth 88 fathoms; bottom temperature 11.4° C.; 60 minute haul.

Station 20,402: February 28, 1929; Lat. 40° 04′ N., Long. 73° 14′ W.; depth 28 fathoms; bottom temperature 4.4° C.; 30 minute haul.

Station 20,409: March 3, 1929; Lat. 37° 36′ N., Long. 74° 17′ W.; depth 100 fathoms; bottom temperature 11.4° C.; 30 minute haul.

The gear used in making these hauls was a 35-foot shrimp trawl of 1½ inch stretched mesh.

The fishes caught by the *Albatross II* at these stations may now be listed.

1. *Scyliorhinus retifer*

Two specimens, one each at Station 20,399 and 20,409; lengths, 420 and 430 mm.; both males.

At the time Garman described this species, in 1881, under the name of *Scyllium retiferum,* only one specimen was known. The type, 12¼ inches long, was dredged by the *Blake* off the coast of Delaware in 89 fathoms (Lat. 38° 22′ 05″ N., Long. 73° 33′ 40″ W.). Goode and Bean (1896)[5] record that "The Fish Commission has since obtained several others," and Nichols[4] records a specimen trawled in Lat. 39° 39′ N., Long. 72° 07′ W.

According to our present knowledge this small shark is restricted to the western Atlantic, in deep water, along the continental slope. The localities for the few specimens taken have centered in the offing of Delaware Bay. The six-inch fish dredged by the *Blake* off Bermuda, in 200 fathoms, was at first thought by Goode and Bean to be a new species which they would have called *Scylliorhinus boa,* but which they later considered an immature example of *S. retifer.* Garman, however, found *S. boa* to be a valid species and to be the young of Ribeiro's (1907)[6] *Catulus haecklii,* taken off Rio Janeiro in 43 fathoms.

S. retifer is so well marked that no description of the two specimens at hand need be given. The color pattern of both is virtually identical with that of Goode and Bean's fish pictured on plate 4, figs. 14 and 15, of their *Oceanic Ichthyology.*

2. *Squalus acanthias*

Three adult specimens at Station 20,399.

3. *Argentina striata*

One specimen, at Station 20,409; length 112 mm.

This rare fish was first described by Goode and Bean (1896)[5] from specimens collected by the *Albatross* in the Gulf of Mexico (Lat. 28° 36′ N., Long. 85° 33′ W.), at a depth of 111 fathoms. None has been recorded since that time.

Following is a partial description of the *Albatross II* specimen:

Total length 112 mm.; standard length 99 mm.; depth 12 mm.; head 27.5 mm.; eye 10 mm.; end of snout to origin of dorsal 45.5 mm.; origin of dorsal to base of mid-caudal rays 55.5 mm.; dorsal rays 10; anal rays 11; origin of adipose over anterior half of anal fin; gill-rakers 7 or 8 on

[6] A. de Miranda Rebeiro, Fauna Brasiliensis, Peixes, Arch. Mus. Nat., 14(pt. 2), 1907: 137-217.

lower limb of first arch. The scales are missing and can not be counted accurately, but there appears to have been about 50. The color has faded in alcohol, but the body is light grayish above and white below. The silvery band below the lateral line, mentioned by Goode and Bean, is present on this specimen also.

4. *Poronotus triacanthus*

Three specimens, at Station 20,399; lengths 227 to 280 mm.

5. *Hypoclydonia bella*

One specimen, at Station 20,409; length 105 mm.

This fish was described by Goode and Bean (1896)[3] from specimens collected in the Gulf of Mexico, and along the Atlantic Coast of the United States between latitudes 32° 43′ and 36° 20′ N., at depths ranging from 90 to 280 fathoms.

The specimen at hand appears to be the first that has been recorded since the original description. It exceeds in length Goode and Bean's specimens by 15 mm., and extends the range in latitude to 37° 36′ N.

A description of the specimen taken by the *Albatross II,* follows:

Total length 105 mm.; standard length 86 mm.; depth 21 mm.; head 29 mm.; eye 9.5 mm.; interorbital 9 mm.; snout 6.5 mm.; maxillary 14 mm.; ventral fin 16 mm.; pectoral fin 21 mm.; dorsal X-1, 9; anal II, 7; ventral I, 5. Second spine of first dorsal and of the anal serrated anteriorly. Gill-rakers rapidly decreasing in size, largest equal to diameter of pupil, 15 on lower limb of first arch. Scales all missing, about 32 according to the impressions. Color in alcohol light olive along the back, not reaching below median line of sides; lower sides and below, silvery. The traces of purplish brown on the upper parts of head and the dark triangular blotch on the upper part of spinous dorsal, mentioned by Goode and Bean (1896, p. 237)[3] are evident on this specimen.

In the generic description of *Hypoclydonia,* Goode and Bean describe the anal as having 2 spines, but in their description of *H. bella,* they give 4 spines. The latter count appears to be an error, as the *Albatross II* specimen has 2 spines, the number recorded by Goode and Bean for their genus.

6. *Myoxocephalus octodecimspinosus*

Twelve specimens, at Station 20,402; lengths 48 to 74 mm. (average, 60 mm.). Many adult specimens were also taken on this station.

7. *Peristedion miniatum*

Three specimens, at Station 20,399; length 304, 305, 305 mm.

This species was described by Goode (1880)[2] from specimens dredged by the *Fish Hawk* in Lat. 40° 02′ N., Long. 70° 23′ W. Goode and Bean (1896)[3] record specimens taken along our coast by the *Blake, Fish Hawk* and *Albatross* between latitudes 32° 24′ and 40° 02′ in depths ranging from 93 to 192 fathoms. Within a few miles of the place where the types were dredged, two specimens were caught by the *Fish Hawk* on September 1, 1899, and Nichols (1913)[4] records specimens trawled along the continental shelf southward from New York in November, 1912.

The following measurements and counts were taken from the *Albatross II* specimens:

Total length	305 mm.	305 mm.	304 mm.
Standard length	280	280	277
Depth	58	52	52
Head to end of preorbital process	105	100	104
Length of preorbital process	15	16.5	16
Eye	21	21	20
Eye to end of preorbital process	57	54	58
Interorbital	19.5	15.5	16.5
Least depth of caudal peduncle	7.5	7.5	7.5
Number of spines extending along each side of dorsal, to caudal:			
Right side	28	27	28
Left side	28	28	28
Dorsal	VIII, 18	VIII, 18	VIII, 18
Anal	17	17	18
Ventral	II, 4	II, 4	II, 4
Pectoral	2+11	2+10	2+11

Color, red.

8. *Lopholatilus chamaeleonticeps*

One specimen, at Station 20,399; length 610 mm.

9. *Zoarces anguillaris*

Two specimens, 154 and 167 mm. long, 4 specimens 280, 285, 330 and 335 mm. long and 5 adult specimens, all taken at Station 20,402.

10. *Merluccius bilinearis*

One small specimen (75 mm.) and 15 of medium to large size at Station 20,399; 18 specimens 65 to 98 mm. long (average 78 mm.), 3 specimens 195, 202, 230 mm. long, and 5 adults, at Station 20,402; 98 specimens ranging between 210 and 460 mm. (63 of them 240 to 270 mm. long) at Station 20,409.

On November 10, 1928, the *Albatross II* made one haul off Long Beach, New York, in 11 fathoms, in which were caught 18 silver hake 57 to 118 mm. long (average 77 mm.). The fact that the young specimens dredged in February, 1929, were of virtually the same length as those taken in November, 1928, suggests that there was little growth throughout the winter. Silver hake spawn in summer and, on the basis of these November and February catches, attain a length of about 75 mm. by the following winter. According to the length frequency distribution of the fish taken at Station 20,409, the silver hake reaches a length of about 250 mm. by the second winter, when about 1½ years old.

Silver hake have been trawled in many places along the continental slope in 50 to 300 fathoms as recorded by Goode and Bean (1896)[1] and by Bigelow and Welsh (1924).[1] The latter point out that this hake leaves the Gulf of Maine in the late fall and probably winters along the slope south of New England. *Merluccius bilinearis* has usually been found in water warmer than 7°C., so that the catch made at Station 20,402, in a temperature of 4.4° C. is of particular interest.

[1] Henry B. Bigelow and W. W. Welsh: Fishes of the Gulf of Maine, Bull. U. S. Bur. Fish., 40, part 1, 1924 (1925): 567 pp.

11. *Gadus callarias*

Six specimens, at Station 20,402; lengths 360 to 600 mm.

12. *Urophycis chuss*

Twenty-five specimens, adult, at Station 20,399; one specimen, length 155 mm. at Station 20,402; 60 specimens 240 to 570 mm. at Station 20,409.

13. *Urophycis tenuis*

Five specimens, adults, at Station 20,399.

14. *Urophycis regius*

Two specimens, 59 and 65 mm. long, at Station 20,399.

15. *Coelorhynchus carminatus*

Three specimens, at Station 20,409; lengths 205, 222, 225 mm.

These specimens differ somewhat from the description furnished by Goode and Bean (1896)[3] in that the pectoral fin reaches the origin of anal and that the longest filament of the ventral fin reaches the anal (in two specimens, 205 and 222 mm. long).

16. *Paralichthys oblongus*

Two specimens, 304 and 355 mm. long, at Station 20,399; 1 specimen, 150 mm. long, at Station 20,402.

In addition to these specimens, the *Albatross II* dredged five, 118 to 156 mm. long (average 131 mm.) on November 11, 1928, off Rockaway, New York, in a depth of 11 fathoms.

17. *Paralichthys dentatus*

Two specimens, at Station 20,409; lengths 620 and 650 mm.

18. *Limanda ferruginea*

One specimen, 182 mm. long and 75 specimens, of 250 to 380 mm., at Station 20,402.

19. *Pseudopleuronectes americanus*

One specimen, at Station 20,402; length 230 mm.

20. *Citharichthys arctifrons*

Twenty specimens, 78 to 118 mm. long, at Station 20,399; 9 specimens, 93 to 156 mm. long, at Station 20,409.

The prolongation of the snout, mentioned by Goode and Bean (1896 p. 444)[3] as peculiar to the larger fish, is very evident on the 156 mm. specimen, in which the protuberance measures 3 mm. On a specimen 132 mm. long it is only 1½ mm. long, and on a fish 105 mm. long it is much smaller.

21. *Monolene sessilicauda*

One specimen, at Station 20,399. Total length 121 mm; standard length 101 mm.; head 21 mm.; depth 35 mm.; dorsal rays 101; anal rays 83; scales 92.

22. *Lophius piscatorius*

One specimen, 303 mm. in length at Station 20,409.

U. S. Bureau of Fisheries Laboratory, Museum of Comparative Zoology, Cambridge, Massachusetts.

A Collection of Fishes from the Texas Coast

By Henry W. Fowler

THIS collection was made for the Academy of Natural Sciences of Philadelphia during the course of the Woolston Expedition to Texas in 1929, by Dr. Francis Harper. Most of the specimens were secured in July in Corpus Christi Bay and vicinity, from Port Aransas to the north end of Laguna Madre. During the following month one specimen and a few notes were secured at Point Isabel, at the south end of Laguna Madre. Ichthyological collecting was merely incidental to the expedition's major work in ornithology. Unless otherwise stated, all the specimens from Port Aransas were obtained by means of a small shrimp trawl, operated by a local fisherman in an inner channel at a depth of about 30 feet.

Corpus Christi Pass no longer extends to the Gulf, from which it is now shut off at the outer end by a sandy beach that joins Padre and Mustang Islands. Laguna Madre is said to have become completely filled with sand at about the middle of its extent.

Measurements in millimeters refer to the total length. Local names when known, are given in quotation marks. These names and the field notes are the work of Dr. Harper, who has very kindly placed them at my disposal. Of the species mentioned 29 are represented by specimens; the others, based on Dr. Harper's notes, are indicated by the affixed asterisk.

1. *Sphyrna tiburo* (Linnaeus)*

One dead individual noted in July on the Gulf beach near Corpus Christi Pass.

2. *Pteroplatea micrura* (Schneider)

One, 160 mm., from Port Aransas, July 6.

3. *Lepisosteus spatula* (Lacépède)*

An "alligator gar" was seen near the north end of Corpus Christi Pass, and a dead one at Flour Bluff, Laguna Madre. The species is also reported in the channels about Port Aransas.

4. *Elops saurus* Linnaeus

One "skipjack," 188 mm., from Corpus Christi, July 15. It had been caught on a line in shallow water.

5. *Megalops atlanticus* Valenciennes*

Port Aransas is a well known resort of tarpon fishermen. Numbers

of the fish were being caught in July in the adjacent part of the Gulf and some were reported in the inner channels. One of the baits used is young mullet. There is also tarpon fishing at Point Isabel, where a six-foot specimen was brought in on August 22.

6. *Brevoortia patronus* Goode*

On August 22 a fishing smack came in to Point Isabel from the Gulf with a small catch of *Brevoortia,* presumably of this species. The Mexican crew called it "salvina."

7. *Galeichthys felis* (Linnaeus)

Two specimens, 140-148 mm., caught on a line at Flour Bluff, Laguna Madre, on July 24. Two young ones, 42-46 mm., each with large egg-sac, taken at Port Aransas, July 28. At this port schools of this catfish were active as scavengers, promptly attacking refuse thrown overboard.

8. *Synodus foetens* (Linnaeus)

Two specimens, 155-160 mm., from Port Aransas, July 9 and 29.

9. *Fundulus grandis* Baird and Girard

One, 78 mm., from Shamrock Cove, Corpus Christi Bay, July 16, with hind edge of caudal narrowly white. Another 113 mm., from Flour Bluff, Laguna Madre, July 21. An abundant species in this region.

10. *Cyprinodon variegatus* Lacépède

Four specimens, 37-48 mm., from Shamrock Cove, Corpus Christi Bay, July 16.

11. *Citharichthys spilopterus* Günther

Four specimens, 62-99 mm., from Port Aransas, July 9 and 28.

12. *Ancylopsetta quadrocellata* Gill

One, 148 mm., from Port Aransas, July 29.

13. *Syngnathus mackayi* (Swain and Meek)

A "needlefish," 195 mm., from Corpus Christi Pass, July 18.

14. *Menidia peninsulae* (Goode and Bean)

Four "top-water minnows," 47-59 mm., from Shamrock Cove, Corpus Christi Bay, July 16.

15. *Mugil curema* Valenciennes

Two "mullet," 61-78 mm., from Flour Bluff, Laguna Madre, July 21.

16. *Scomberomorus maculatus* (Mitchill)*

A "Spanish mackerel" caught on line at Aransas Pass, July 9, and several seined in the Gulf surf near Corpus Christi Pass, July 19 and 21.

17. *Trichiurus lepturus* Linnaeus

One, 168 mm., from Port Aransas, July 11.

18. *Caranx hippos* (Linnaeus)

One, 102 mm., from Corpus Christi Pass, about July 16. Another, 170 mm., obtained from a fishing vessel at Point Isabel on August 22, had probably been taken in the Gulf.

19. *Selene vomer* (Linnaeus)

Two specimens, 52-58 mm., from Port Aransas, July 13 and 28.

20. *Trachinotus palometa* Regan*

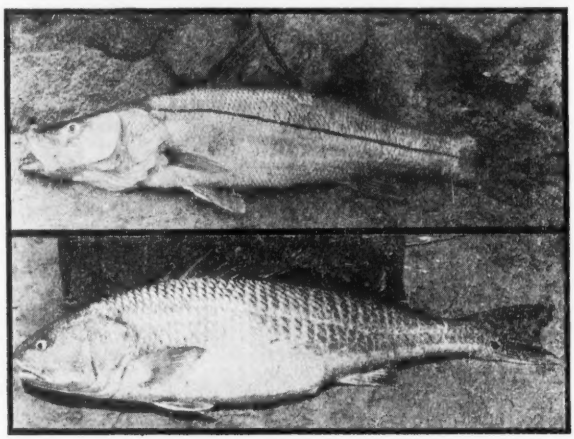
About two seen in a fisherman's haul from the Gulf surf near Corpus Christi Pass, July 21. Three dark vertical bars noted.

21. *Centropomus undecimalis* (Bloch)*

A fresh specimen nearly two feet long, seen in a fish house at Port Aransas, July 12. Locally called "pike" or "robalo." On July 19 some fishermen seined a female with roe in the Gulf surf near Corpus Christi Pass. It was 35 inches in total length and weighed 14 pounds (see upper figure). Specimens with roe were said to be seldom seen there. On July 21 the same fishermen secured another "pike" in the Gulf surf.

22. *Conodon nobilis* (Linnaeus)

The "mango croaker" was common in a fisherman's haul from the Gulf



Upper figure. *Centropomus undecimalis* (Bloch): from a specimen 35 inches long, taken in Gulf surf on Mustang Island, Corpus Christi Pass, Texas.
Lower figure. *Sciaenops ocellata* (Linnaeus): from a fish 31¼ inches long, taken in Corpus Christi Pass, Texas.

surf near Corpus Christi Pass on July 21. One specimen, 192 mm., was preserved.

23. *Orthopristis chrysopterus* (Linnaeus)

Three "pigfish," 88-190 mm., from Port Aransas, July 9, 1928. The

smallest shows a median indistinct dusky band extending from near snout end to eye, and then axially from eye to caudal base medially. Six dark saddles along bases of dorsals.

24. *Lagodon rhomboides* (Linnaeus)

A "perch," 91 mm., taken in a cast net in a shallow lagoon on an island near Port Aransas, July 28.

25. *Archosargus probatocephalus* (Walbaum)*

Several seen that had been caught by line at the city pier, Corpus Christi, July 25 and 26.

26. *Cynoscion nothus* (Holbrook)

Two, 110-137 mm., from Port Aransas, July 9. Lower gill-rakers 9 or 10. Anal rays II, 11. Caudal with median rays produced.

27. *Cynoscion nebulosus* (Cuvier)

A "speckled trout," 57 mm., from Shamrock Cove, Corpus Christi Bay, July 16. The species was noted among a fisherman's haul from the Gulf surf near Corpus Christi Pass on July 21. It is frequently taken on the line in Corpus Christi Bay.

28. *Sciaenops ocellata* (Linnaeus)*

Many fishermen may be seen in pursuit of 'redfish' about the north end of Laguna Madre. They generally stand in several feet of water, using rod and line. A fish taken in Corpus Christi Pass on July 21 was 34 3/4 inches long and weighed 15 pounds when dressed (see lower figure). Another was seined in the Gulf surf near this pass on July 19.

29. *Leiostomus xanthurus* Lacépède

Two, 93-100 mm., from Port Aransas, July 9 and 28.

30. *Micropogon undulatus* (Linnaeus)

Two "croakers," 108-114 mm., from Port Aransas, July 9 and 28.

31. *Chaetodipterus faber* (Broussonet)

An "angelfish" or "spadefish," 37 mm., from Port Aransas, July 9. Dusky brown, with four darker transverse bands; first through eye, second from predorsal region to behind ventral bases, third from spinous dorsal and fourth on caudal peduncle separating well contrasted white caudal markings. Pectoral pale. Ventral black.

Another from the Gulf surf near Corpus Christi Pass, July 21. The species was included in a catch noted on a fishing smack that had come in from the Gulf to Point Isabel on August 22.

32. *Gobionellus oceanicus* (Pallas)

One, 210 mm., from Port Aransas, July 9. Depth 8 3/4; head 4 2/3, width 1 3/4. Snout 3 1/8 in head (measured from snout tip); eye 4 4/5, 1 2/5 in snout; the maxillary reaches to opposite hind pupil edge, length 1 1/3 in head. Teeth moderate, in narrow bands in jaws. Interorbital level,

twice eye diameter. Gill rakers 6+7, lanceolate, slender, rather flexible, length about 1/4 of eye.

Scales 63 in median lateral series to caudal base and 4 more on latter, 14 transversely; 20 rows of predorsal scales; well developed patch of scales on opercle above. Lower edge of eye with 5 transverse or vertical rows of papillae, interrupted by 2 horizontal rows on cheek; a transverse row across cranium behind eyes and row down behind preopercle edge.

Dorsal VI, 14; spines flexible, ending in filaments, fourth spine 4 1/8 in combined head and body to caudal base, last ray 1 1/10 in total head length. Anal 15, last ray 1 3/5. Least depth of caudal peduncle 2 1/4; ventral 1. Pectoral rays 17, fin 5 2/5 in combined head and body; caudal 1 7/8.

Pale brown generally, little darker along back. Iris gray, with green tints. Fins all with more or less greenish.

33. *Gobiosoma molestum* Girard

Three specimens, 56-80 mm., seined in shallow water at Flour Bluff, Laguna Madre, July 21 and 23.

34. *Leptecheneis naucrates* (Linnaeus)

One, 95 mm., from Port Aransas, July 11. Said to have been attached to a young 'sand trout' (probably *Cynoscion nothus*).

35. *Opsanus tau* (Linnaeus)*

Two seen freshly caught on the city pier at Corpus Christi, July 4 and 25. A local name seems to be "dogfish," because "it sort of barks."

36. *Nautopaedium porosissimum* (Valenciennes)

A "butterfish," 128 mm., from Port Aransas, July 28. Lateral lines golden in the fresh specimen.

37. *Gobiesox strumosus* Cope

One, 47 mm., from Port Aransas, July 13. Another, 40 mm., from Flour Bluff, Laguna Madre, July 23. This is probably the most southern record for the species.

38. *Sphoeroides spengleri* (Bloch)

Two young, 38-39 mm., from Port Aransas, July 9.

39. *Chilomycterus schoepfi* (Walbaum)

One, 114 mm., from Port Aransas, July 9.

Academy of Natural Sciences, Philadelphia, Pennsylvania.

Habits and Birth of Young of the Lined Snake, *Tropidoclonion lineatum* (Hallowell)

By Edith R. Force

In spite of the fact that the lined snake, *Tropidoclonion lineatum* (Hallowell), is a fairly common species throughout its range in Oklahoma and Texas, apparently little has been recorded on size of broods and birth of young, other than the statement by Strecker (1926, pp. 4-5) that "usually from the first to the fifteenth of August the female *Tropidoclonion lineatum* brings forth living young, the brood ranging in number from six to ten."

The lined snake occurs in abundance in the vicinity of Tulsa, Oklahoma. Specimens were collected under boards, tar paper, cement building blocks or broken pieces of tile, in vacant lots near dwellings. Many were uncovered by the removal of an old board sidewalk. The ground under these objects was usually bare and moist, but not wet. When the covering was heavy and pressed closely to the ground the snakes lay in a loose coil in a wide burrow or runway, but when the covering rested lightly on the ground, as when on grass, there was no burrow. Although the snakes often occurred separately, it was very common to find several together. If undisturbed they made no effort to move for several seconds, but when picked up, they thrashed about in the hand, exuding musk from the scent glands.

These snakes have been found eating earthworms. In captivity the males and immature individuals seemed to feed somewhat more readily than the females. They ate cut earthworms in a dish, or whole worms offered quietly from forceps. Large gravid females, which were kept separate, ate practically nothing from the time of capture until the young were born, a period of as much as three months. A case of cannibalism in captivity was observed by Mrs. A. E. Gilmore. One morning a female in her possession gave birth to twelve young. In the evening only six were found. It is unlikely that they escaped, as the cage was in good condition and in constant use. The next morning only four were left, and the adult was observed in the act of eating one.

Nocturnal activity is indicated from the fact that during the day these snakes remain coiled under the pan or board in the wood pulp at the bottom of the cage, but at night they are often seen moving about.

The time of mating has not been determined, but Gloyd (1928, p. 131) thinks it may occur in the autumn. A female collected by Mrs. A. E. Gilmore in the fall gave birth to twelve young on August 16 of the following year, but it is not certain when the female was isolated.

Birth of young of the lined snake was first observed in the summer of 1928, although others had previously been born in the laboratory. The last week before parturition the females became very restless and often lay in the open with occasional contortions of the body. During each deposition the female elevated her tail, at first quite erect, but later not so stiffly or so high. While the young were being deposited the females were

comparatively quiet, except between the last two. The embryos could be seen moving down the body from the anterior end of the oviduct as the adult moved about the cage. In one instance, after the deposition of the last young snake, the female was quite restless, but extremely weak. As she raised her body on the side of the cage she would fall back.

At birth the young were folded in three parts in such a manner that the middle of the body emerged first, sometimes the head also protruded. The fine tissue membrane of the enveloping embryonic sac was slightly moist. It was usually immediately burst by the movement of the head of the young snake, although sometimes as much as five minutes elapsed before the complete emergence. The body remained coiled until the head had made its exploration. In a few instances the head was free and actively moving before the posterior part of the body had emerged. No egg tooth was discernible. With the first movements, the tissue slipped off the rest of the body, except for the attachment of the cord and blood vessels through the opening of the ventral scale sixth from the anal plate. This soon became severed, but the opening did not completely close for several days, and in many adults the double scale, at this point, was still visible.

The young were deposited quite rapidly. Extrusion was completed in from ten seconds to three minutes, and the intervals between births varied from less than two to more than forty-five minutes.

Birth dates varied in twenty-three instances from August 1 to August 31, and the numbers in the brood varied from two to twelve and averaged between seven or eight.

The young were exceptionally active, as soon as born, protruding the tongue and moving rapidly about the cage. Within an hour they shed their skins. This act was repeated each day for several days. When three days old some young snakes would eat tiny earthworms from the forceps.

At birth the young snakes varied in length from 70 mm. to 130 mm., in measurements of one hundred forty-five specimens. The pattern of black spots on the ventral surface was distinct, but the stripes on the upper side, although visible, were not well defined until after the second shedding of the skin. At first the general ground color was a dingy grey, with a lighter grey stripe, but later it became browner and more like the adult, with grey, yellow, or orange stripes.

Summary

1. The lined snake, *Tropidoclonion lineatum* (Hallowell), is found in abundance, in the vicinity of Tulsa, Oklahoma, under debris in vacant lots near dwellings.
2. It eats earthworms. One case of cannibalism is recorded.
3. Birth dates observed varied from August 1 to 31.
4. Young snakes in a brood varied in number from two to twelve, averaging between seven and eight.
5. Extrusion of young is rapid (ten seconds to three minutes); intervals between births vary from less than two to more than forty-five minutes.
6. The young at birth varied from 70 mm. to 130 mm. in total length.

ACKNOWLEDGMENTS

The writer desires to express her appreciation to Dr. P. P. Claxton and the Board of Education of Tulsa for the free use of the facilities of Woodrow Wilson Junior High School biology department during this time; to Mrs. A. E. Gilmore and Miss Isabelle Borders for assistance in the care of the animals, and to Dr. F. N. Blanchard and Mr. H. K. Gloyd for criticising the manuscript.

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TULSA, OKLAHOMA.

Some Amphibians and Reptiles of Monongalia County, West Virginia

By HARLEY D. BOND

AMPHIBIANS

Necturus maculosus (Rafinesque). This species is common in the Monongahela and Cheat rivers.

Cryptobranchus alleganiensis (Daudin). Common in Monongahela and Cheat rivers.

Ambystoma maculatum (Shaw). Not common. The specimen in the West Virginia University Museum was brought in alive, and while in the aquarium eggs were deposited and the skin was shed.

Ambystoma microstomum Cope.

Ambystoma tigrinum (Green). Not uncommon.

Desmognathus fuscus fuscus (Rafinesque). Probably our most common salamander. May always be found in moist ravines under sticks and stones. Many variations in color markings.

Plethodon glutinosus (Green). Common.

Eurycea bislineata bislineata (Green). Common.

Eurycea longicauda (Green). This specimen was taken in Preston County, but close enough to Monongalia to be counted a resident. Not common.

Eurycea lucifuga Rafinesque.

Gyrinophilus porphyriticus (Green).

Triturus viridescens viridescens (Rafinesque). Not uncommon. One specimen of the red phase was taken, and several green adults are in the Museum.

Bufo americanus Holbrook. Very common in gardens, around houses, and around outbuildings.

Bufo fowleri Garman. Common.

Hyla crucifer Wied. Very common around ponds in spring. Easily heard, but caught with difficulty.

Hyla versicolor versicolor (Le Conte). Heard around ponds in the spring. Common.

Rana catesbeiana Shaw. Common in larger ponds, and not infrequent in smaller ponds.

Rana sylvatica Le Conte. Not common, but sometimes found along moist ravines and brooks shaded with bushes.

Rana pipiens Schreber. Common in ponds.

REPTILES

Eumeces fasciatus (Linné). Rare.

Sceloporus undulatus (Latreille). Not common, but found sometimes at Cooper's Rock.

Diadophis punctatus edwardsii (Merrem). Not common.

Heterodon contortrix (Linné). Not common.

Liopeltis vernalis (Harlan). Not common.

Coluber constrictor constrictor (Linné). Common. Found in meadows, around barns and along roads.

Lampropeltis triangulum triangulum (Lacépède). Common, especially around barns and outhouses.

Natrix septemvittata (Say). Most common water-snake in Monongalia County. Often confused with *Thamnophis sirtalis.*

Natrix sipedon fasciata (Linné). Common along streams.

Natrix taxispilota (Holbrook). Common. Often confused with *Agkistrodon mokasen,* and commonly called "water copperhead."

Thamnophis sirtalis sirtalis (Linné). Most common and most widely distributed snake.

Agkistrodon mokasen Beauvois. Very common in stony and newly cleared land.

Crotalus horridus Linné. Common in Cheat Mountains, but not as widely distributed as the copperhead.

Chelydra serpentina (Linné). Common in streams and muddy ponds.

Terrapene carolina carolina (Linné). Common in woods, in briar patches and along roads.

Clemmys insculpta (Le Conte). Not uncommon, but much less common than *Terrapene c. carolina.*

DEPARTMENT OF ZOOLOGY, WEST VIRGINIA UNIVERSITY, MORGANTOWN, WEST VIRGINIA.

A New Frog from Porto Rico

By CHAPMAN GRANT

I HAVE made a large collection of Porto Rican amphibians and reptiles, which adds ten species and sub-species to the Porto Rican fauna. Some are described in the Journal of the Department of Agriculture of Porto Rico, Vol. 15, No. 3, June, 1931. A series of 60 specimens of a large frog from the Luquillo Mountains, of the eastern end of Porto Rico, represents an undescribed species. It differs so strikingly from most species of the genus *Eleutherodactylus* in body form and extensive webbing of the toes, that it is immediately recognizable as distinct from any other species of this group. The species may be called:

Eleutherodactylus ***karlschmidti***, sp. nov.

Type.—From Luquillo Forest, Eastern Porto Rico, collected by Chapman Grant, April 11, 1931. Chapman Grant collection, No. 1483, adult.

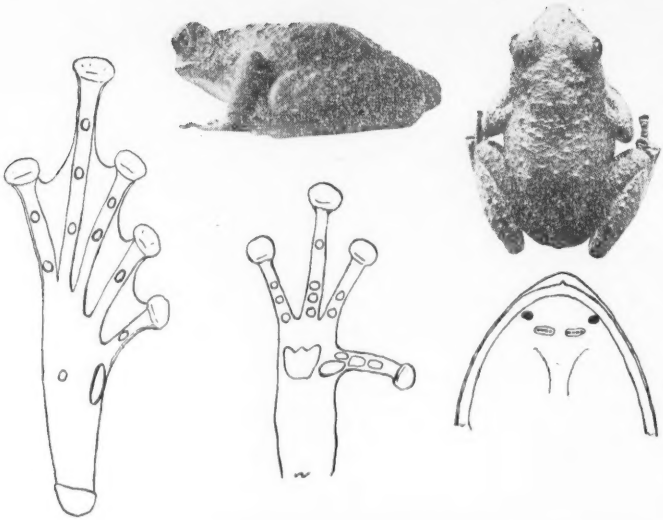
Range.—Known only from the Luquillo Mountains, in eastern Porto Rico.

Diagnosis.—Distinguished from other West Indian *Eleutherodactylus* by very extensive webbing of the toes; eye large, belly smooth; vomerine teeth in small patches.

Description of Type.—Habitus stocky, head slightly wider than body, eyes large and protruding, giving the head a wide appearance; limbs strong, relatively short, heels not meeting when legs are placed at right angles to the body; the tibio-tarsal joint reaches just beyond the eye when the leg is laid along the side of the body. Vomerine teeth in small transverse patches, behind and within the choanae, the distance between the patches a little less than their length. Tongue large, oval, not notched behind, free at least half its length. Nostrils much closer to tip of snout than to eye; canthus rostralis distinct, loreal area nearly vertical; distance between upper eyelids a little wider than the eyelid; eye large, as long as its distance from the nostril. Tympanum small, distinct, smaller than the largest digital discs, slightly less in diameter than its distance from the eye; a fold of skin from the eye over the tympanum to the shoulder. Fingers free, with large disks; first finger very slightly shorter than second; metacarpal tubercles large; toes with very large disks, larger than those of fingers. Webs extensive, extending to middle of disks of all toes. Inner metatarsal tubercle elongate, outer small. Skin entirely smooth below and nearly smooth above. In living specimens the dorsum is covered with raised warts composed of fine radiating lines which form a complicated network over the skin; when the skin is drawn tight, by squeezing a living specimen, these warts smooth out; in a freshly killed specimen they persist on the eyelids, on the shoulder and snout, and near the vent.

The coloration in alcohol is a very dark, nearly uniform, gray above, paler beneath, but marbled all over with dark gray; both sides of thighs are obscurely mottled with light and dark gray.

In life, the general color of the back is marbled green, yellow and black, appearing nearly black except on close examination. There is a yellow band



from eye to eye; a yellow vertical line before the eye to the lip, extending backward to the tympanum; there is a second obscure transverse light band at the shoulders, and a more distinct one half way along the back; belly, sides and thighs uniformly marbled with gray, some plain gray.

Measurements.—Snout to vent 80 mm.; width of head 30 mm.; snout to posterior edge of tympanum 30 mm.; leg from vent 113 mm.; foreleg from axilla 47 mm.; tibia 40 mm.; hind foot 47 mm. (largest specimen).

This species lives beneath boulders in the mountain streams of the Luquillo Forest. I am indebted to Mr. Karl Patterson Schmidt, for whom the species is named, for examination of the generic characters, and to Captain Frederick V. Edgerton, U.S.A., for the photographs, reproduced herewith, which exhibit the habitus and peculiar skin rugosity of the new form.

MAJOR, 65TH U. S. INFANTRY, PORTO RICO.

Ascaphus truei in Humboldt County, California, with a Note on the Habits of the Tadpole

By GEORGE S. MYERS

THE remarkable salientian *Ascaphus truei* Stejneger, since its discovery at Humptulips, Washington, by Cloudsley Rutter in 1897, has been found at several localities in the Puget Sound region of that state. To the south of this there are but two published records, one of a single adult taken on Red Creek in the Santiam National Forest, Linn County, Oregon, and another, also of a single adult, from Craggy Peak, Siskiyou County, California. Craggy Peak is a little south of Callahan, in south central Siskiyou County.

On June 22, 1930, while returning from the Eugene meeting of the American Society of Ichthyologists and Herpetologists, I found *Ascaphus* in central Humboldt County, California. During a momentary stop along the Redwood Highway to hunt salamanders under some likely-looking slabs, I noticed a tiny swift flowing brook, not much more than a yard wide and a few inches deep. Two larvae of *Dicamptodon ensatus* were seen, which I finally fished out by hand. Crawling further upstream, under a tangle of logs and brush, I caught sight of a black tadpole with a white tail-tip clinging to a stone in the swiftest part of the current. It could be none other than *Ascaphus,* and it was with infinite care that I stalked it and induced it to let go the stone. Others were soon discovered and in a few minutes I had four of them. My only collecting equipment being a six ounce bottle of alcohol I did not attempt to take more. A short search was made for adults but although there were many small frogs in the stream, all caught were young *Rana boylii boylii.*

The brook is a tiny, cold, swift hill stream flowing directly into the South Fork of the Eel River a few hundred yards below the Redwood Highway. The portion examined was within 200 feet of the road on the upper side. The spot at which the highway crosses the stream is, by the road, just ½ mile north of the junction with the road to Holmes, 1 mile north of Chad Creek Bridge, 6 miles north of Dyerville, and 8.6 miles north of Weott. Scotia is but a few miles to the north. The brook flows through a dense giant redwood forest, and its temperature was low. Unfortunately no thermometer was at hand, and I was not able to stop more than a few minutes. The locality is nearly 90 miles southwest of the Siskiyou County record and about 55 miles further south. It extends the range of *Ascaphus* well down the Coast Range into the redwood belt and to within 18 miles of the ocean. I do not have the altitude but it is not more than a few hundred feet.

The tadpoles seen were in the swifter parts of the little brook, none being present in the slow flowing alga-grown section at the highway, although this part also was stony. A casual examination may miss the larvae due to their preference for the riffles, though their black color and milk-white tail tip make them easily seen on the rocks when looked for. When dislodged they are not swirled away many inches before they quickly clamp their sucker to another stone. One attached itself to my hand as I tried to pick it up. On close examination it is seen that the color is not actually black, but an exceedingly heavy mottling and clouding of blackish on a dull grayish background. This color includes the tail fin. The caudal end, for its last 6 or 7 mm., is jet black, with a conspicuous round milk-white spot at its very tip. All four tadpoles before me had begun to develop the hind legs. They are of approximately the same size, the largest being just 50 mm. total length. No smaller ones were seen.

Natural History Museum, Stanford University, California.

On the Occurrence of a Throat-fan in *Callisaurus ventralis gabbii* and two Species of *Crotaphytus*

By Charles E. Burt

SINCE reporting the occurrence of a distinctly developed throat-fan in two males of the ocellated sand lizard *Uma notata* (Copeia, 1931, No. 1, pp. 15-16, fig. 1), I have observed the structure in other iguanid lizards.

In view of the fact that the genera *Uma* and *Callisaurus* are very closely related, it is not surprising that a throat-fan very similar in every respect to that of the adult males of *Uma notata* should now be found in an adult male of *Callisaurus ventralis gabbii,* which was collected by Mr. Charles M. Bogert of Los Angeles, at Lovejoy Springs, Los Angeles County, California, on April 10, 1931. Mr. Bogert has written that the lizard appeared to be "so interested in displaying his throat-fan when discovered that it was no difficulty to collect him" and that "although the mating season for Californian lizards had not quite begun, this individual posed on conspicuously large rocks as it operated its throat-fan (which has a patch of bright pink near its center) and curled its tail over its back." The latter action is no doubt designed to effect a display of the distinctive series of transverse black bars which are present beneath the otherwise immaculately white tail. Another feature of the mating preliminaries, as inferred from observations in the laboratory, seems to be a raising of the body high in the air through a vertical extension of the relatively well developed forelimbs in order to bring into view the beautiful blue-green patches which surround the prominent deep-black ventrolateral bars which are present on each side of adult males of this species.

During times of decided excitement, such as those brought about by excessive rubbing and tickling, the throat-fan of the lizard under discussion is thrown out and drawn in, but under normal conditions it is characteristically kept hidden from view so that repeated observations and even ordinary handlings are usually insufficient to cause its release. From this it is to be inferred that the throat-fan of *Callisaurus ventralis gabbii* would ordinarily be overlooked in both living and preserved material.

The throat-fan of a Texan male of the reticulated mountain-boomer, *Crotaphytus reticulatus,* has been shown to me recently by Dr. Edward H. Taylor of Kansas University, and I have found a very similar one to be present in a series of males of the collared lizard, *Crotaphytus collaris,* which was also collected in Texas. In *Crotaphytus* the throat-fan is blunter, less extensible, and more pouch-like than in *Uma* and *Callisaurus,* the skin bordering the fan being somewhat inflated when exposed, rather than pulled tightly over a sharp, laterally compressed fan-element. It is probable that the relatively incomplete throat-fan of the collared lizard plays an important role in the mating preliminaries of the species, in that its extension brings the unusually beautiful, orange-tinted throat into full view.

Southwestern College, Winfield, Kansas.

Reproduction of Some Florida Snakes

By O. C. Van Hyning

As the published information concerning the breeding of snakes is meager, I believe it worth while to record the following cases which have come under my observation.

Abastor erythrogrammus (Daudin). A large female rainbow snake from Eureka, Marion County, Florida, was killed July 15, 1928, and found to contain twenty-two well developed eggs. These eggs, which averaged 29 mm. by 37 mm., were covered with a cream-colored leathery integument. No embryos were to be seen.

Farancia abacura (Holbrook). On July 23, 1929, a female horn-snake 235 cm. in length was found, freshly killed, on the highway near Payne's Prairie, about five miles south of Gainesville, Florida. From this specimen were taken one hundred and four eggs averaging 21 mm. by 30 mm., which were covered with a tough white skin, and which filled the body cavity for about two-thirds of its posterior portion.

Coluber constrictor constrictor (Linnaeus). In April, 1924, sixteen eggs were given me by a farmer who had turned them up while plowing near Gainesville, Florida. Upon examination, these eggs were found to contain young snakes of this species, which were about to emerge.

Lampropeltis getulus getulus (Linnaeus). A pair of king-snakes was discovered in copulation on April 19, 1930, near a ditch along the highway six miles southwest of Gainesville, Florida. When found, at 6:20 P.M., they had the heads and about eight inches of the bodies buried under the loose sand and grass roots; the male lay to the left and slightly above the female, the two bodies parallel and in contact for their entire length, with the ventral surfaces of the tails in contact, that of the male twisted beneath the female. They remained in this position for twenty minutes, when they were placed in a bag; at 8:20 P.M. when removed from the bag they had separated. Unfortunately, they both were killed during my absence a short time later.

Natrix cyclopion (Duméril and Bibron). Two female green water snakes, which were in the same cage, both gave birth to young on the same night, July 15, 1928. The next morning there remained but 15 living and 5 dead young, while one of the adults was in the act of devouring another young. It was evident that both specimens had given birth to young during the night, of which, no doubt, they had eaten a large number before I arrived. This cannibalistic tendency is not unusual among water-snakes in captivity.

Natrix sipedon fasciata (Linnaeus). A female banded water-snake gave birth to thirty-one young while being brought home in a bag, July 16, 1928. Four of these were dead, probably smothered.

Natrix sipedon pictiventris (Cope). July 17, 1928, a large female of this species gave birth to 57 young, 3 of which were born dead. A litter of 33 was produced by a medium-sized female on July 10, 1928, all of which were living; and on July 13, 1928, another snake had 29 young, one of which was dead. The young of both *Natrix sipedon fasciata* and *Natrix sipedon pictiventris* show a great variation of color pattern. A female of either form may produce in the same litter typical young of both forms, as well as intermediates between the two. As all degrees of variation and intergradation may be found in the same locality, it is questionable if *Natrix sipedon fasciata* and *N. s. pictiventris* are distinct, at least in central Florida.

Thamnophis sackenii (Kennicott). On July 12, 1928, a southern ribbon-snake, which had been kept in captivity for several weeks, gave birth to 11 living young.

Crotalus adamanteus (Beauvois). On August 21, 1925, 14 young diamond-back rattlesnakes were dug out of the hole of a "gopher," *Gopherus polyphemus* (Daudin), five miles west of Gainesville, Florida. A large rattler had been seen to enter the hole, and on digging out the burrow a few hours later, the 14 young were found, although the adult was gone. These young were kept for several weeks, and would take live mice, or dead ones that were still warm, provided they were pulled along the floor of the cage. Mice which had become cold were refused.

FLORIDA STATE MUSEUM, GAINESVILLE, FLORIDA.

Herpetological Notes

APPARENT OVOVIVIPARITY IN THE MEXICAN SKINK, *EUMECES LYNXAE* WIEGMANN.—My attention has been called by Dr. Edward Taylor, of the University of Kansas, to a specimen of *Eumeces lynxae* (No. 48067, Mus. Zool., Univ. Mich.) which was observed to contain six well-formed and well-developed embryos. There have been no records of ovoviviparity in the genus *Eumeces*. Whether in this species it is normal, or whether the observed condition in this specimen is abnormal, can only be decided definitely by future observations on other specimens. It is possible that the condition was the result of delayed egg-laying, with a consequent development of the embryos within the body of the female. And it is also possible that it would have ultimately caused the death of the mother and embryos.

This specimen was collected at Guerrero, Hidalgo, Mexico. It measured 59 mm. from head to vent, and 71 mm. from vent to the end of the tail. Although it contained six embryos the girth of the body was about the same as that of a non-pregnant female of the same body length.

The right oviduct was empty and intact, but it was enormously expanded in the region of the peritoneal aperture. The left oviduct was torn in such a manner that but two embryos, in the posterior portion, were contained in it. Four embryos were free in the body cavity. None of them had an enveloping sheath of any kind.

The viscera of the adult were much reduced in size. The liver was very small; it was displaced to the right of the vertebral column, and partially enveloped the most anterior of the embryos. The alimentary canal was enormously reduced both in girth and length. The most anterior embryo was lodged against the ventricle of the heart; the most posterior, against the anterior cloacal wall. The other four were literally packed in the intervening space. The head of each embryo, with the exception of one, was pointed toward the cloacal region.

In color marking the embryos were almost identical with each other and strikingly similar to the mother. The colors in the adult were denser and darker. Measurements of the embryos are as follows:

	Body Length mm.	Tail Length mm.	Total Length mm.
1.	20.5	24.0	44.5
2.	22.0	24.0	46.0
3.	21.5	23.0	44.5
4.	21.2	23.0	44.0
5.	22.2	24.0	46.2
6.	22.0	23.3	45.3

NORMAN HARTWEG, *Museum of Zoology, University of Michigan, Ann Arbor, Michigan.*

NOTES ON THE AMEIVAS OF PORTO RICO.—*Ameiva exsul* Cope is very abundant in all the lowlands of Porto Rico and the outlying islets. The color and markings vary considerably in individuals, but I have been unable to find any correlation between this and their distribution. The bright yellow to white lateral lines present in all young disappear at different stages of development, and the row of black rectangles below the lateral lines also make their appearance at various stages and without particular correlation with the disappearance of the white line. The amount of blue, especially on the tail, varies greatly in the individual; it is a bright turquoise blue in some instances, whereas in others no blue is discernible, even in large specimens. The ventral coloration is frequently salmon or lavender pink, regardless of sex or size. The white spots, which usually disappear with the white lines, sometimes persist in adult specimens to almost as great an extent as in *A. alboguttata*. Frequently a specimen with a decidedly green back is seen.

When not disturbed, the "iguana" is a friendly fellow, feeding principally on refuse and vegetable matter. They will come around a kitchen and eat onion trimmings and potato peelings. When breaking up their food they use their front feet to hold it down. Specimens of similar size seem on good terms, but the larger ones chase the smaller. When looking things over, the "iguana" bobs its head rapidly up

and down in a small arc.

They never venture out in the cool of the morning. If, when hunting, they suddenly come to a strip of sunlight, they will flatten out, hind legs stretched out, and bask for a few minutes. During the extreme heat of the day they are quiescent, seeking the shady places. As the afternoon cools, they are again active, but retire well before sunset into holes which they themselves excavate under stones or boards, or seek a natural crevice where available.

The ameivas have combs on their toes which are used freely in attempting to scratch off the bright orange mites with which they are often infested. It is strange that the "iguanas" on the small, outlying islets are much more infested with these mites than are those on the main island.

Ameiva wetmorei Stejneger, which is numerous on the southwest extremity of the island, has beautiful coloring. The dorsal stripes become bright yellow on the base of the tail, turning a brilliant green, then gradually becoming peacock blue and finally turquoise blue. Each ring of the blue part of the tail is edged with black, but these black rings are never reproduced. The ventral coloration is frequently a deep salmon pink.

This little *Ameiva* is more sensitive to cold than the preceding form. On a chilly morning of about 75°, these little lizards can be picked up in numbers, almost torpid, from their burrows under stones. Their coloration blends perfectly with the background when they move, making them almost invisible. The rapidity with which they can move is astonishing.—CHAPMAN GRANT, *Major, 65th Infantry, Porto Rico.*

NOTES ON *BUFO MARINUS* (LINNAEUS).—In 1919, during his survey of the amphibians and land reptiles of Porto Rico, Karl P. Schmidt states that he did not see any specimens of *Bufo marinus,* though he heard reports of its introduction. Now they have grown in number, both on the coast and in the interior of the island. At that time the native name "Sapo concho" or shell toad *(Bufo lemur)* was applied to *Leptodactylus.* The name has been gradually transferred to *B. marinus.*

Schmidt gives the measurements of a male and female, but unfortunately his male was considerably larger than the female. This may give a wrong impression, as the adult female is considerably larger than the male. Apparently neither specimen recorded by Schmidt was adult. Measurements of his male compared with a female from Cayey that I measured, are:

	Male	Female
Snout to vent	103 mm.	178 mm.
Width of head	40	64
Hind leg from vent	134	190

The male is frequently a bright yellow, the female dark brown. The male is closely set with spine tipped warts while the female has fewer warts and has a bolder pattern. The remains of these toads are numerous along automobile roads in swampy places. They hide during the day but appear in numbers in ponds at night.

Bufo marinus was introduced at Rio Piedras from Barbados in 1924. *Leptodactylus pentadactylus* was introduced from Dominica in 1929; no results are apparent as yet from the introduction.—CHAPMAN GRANT, *Major, 65th U. S. Infantry, Porto Rico.*

THE MATING OF *ASCAPHUS TRUEI* STEJNEGER.—While studying amphibians in the Carbon River Valley of Ranier National Park on May 17, 1930, with Morton Johnson, I observed the mating of *Ascaphus truei* and, since it is different from any amphibian mating which I have observed, I will give a brief description of it.

When the male and female met, the male crawled on the female's back and clasped her around her body opposite the sacrum, not posterior to her fore limbs as most other Anura do. Whereupon the female straightened her hind limbs so that they extended posteriorly in the same general line of the body and held them so that they formed a narrow V. The male flexed his sacroiliac joint so that his pelvis made nearly a right angle with his vertebral column. Then by muscular manipulation bent his so-called "tail" ventrally so that it made nearly a right angle to his pelvic girdle and

brought it into position to transfer sperm to the female. This "tail," when the male is in a natural position, points posteriorly, but with the two flexes mentioned above it comes to point anteriorly. The color at the base of the tail and the tail itself is reddish brown, indicating a rich blood supply.

This was observed at 11:00 P.M. by flash light after we had placed together males and females which I believe had recently come from hibernation. The females were migrating and were taken only a short distance from the snow. This spring I am trying to get a picture of this mating position and will write more concerning it in my proposed "Amphibia of Washington."—JAMES R. SLATER, *College of Puget Sound, Tacoma, Washington.*

NOTES ON *SYRRHOPHUS MARNOCKII* COPE.—Since its discovery at Helotes, Bexar County, Texas, this seemingly rare little frog has been reported from but two additional localities in adjoining counties: San Marcos, Hays County (Stecker and Williams, Contr. from Baylor Univ. Mus., No. 12, 1927:7), and the vicinity of Austin, Travis County (Strecker, *l.c.*, No. 23, 1930:7). Therefore the following notes on its occurrence in the Big Bend region of western Texas point out a considerable extension of its range.

During the summer of 1928, the Museum of Zoology of the University of Michigan sent a field party into the Chisos Mountains, Brewster County, Texas, to investigate the bird, insect and reptile-amphibian fauna of this isolated range. From July 5 to July 14, we were camped in Juniper Canyon, on the west side of the Chisos, at an altitude of 4,500 feet.

The canyon and adjacent mountain sides were excessively dry at this time. The drouth of the previous summer had been followed by a winter of light snow, most of the springs were dry, and the creek bed was thickly carpeted with fallen leaves. No amphibians were found, even lizards were scarce.

Late in the afternoon of July 8 there was a heavy shower, and at dusk a single *Syrrhophus* was discovered under a stone on a rocky hillside, devoid of vegetation and some distance from water. Another was found the same night in the dry creek bed, during a shower. Twelve others were taken, on subsequent rainy nights, all from, or in the immediate vicinity of the creek.

Hyla arenicolor was active during two dark, misty days, but though a diligent search was made for *Syrrhophus* during the daylight hours, under rocks and in the little caves formed by the huge boulders of the creek bed, none was observed. Nor were eggs found, though a female taken on the night of July 20 contained five unpigmented eggs, each approximately 4 mm. in diameter. The stomach of this female was greatly distended with an ant (*Odontomachus haematodes*), 2 beetles, and fragments of a female termite, of a myrmicine ant and of an isopod.

At no time during the night was *Syrrhophus* found to be active save during, or just after a rain. As noted by Williams, they are very active, escaping by a series of high, long leaps. Mole crickets, which are equally active, were about the size and coloration of the frog, and we often did not know until after the capture whether we were pursuing insects or amphibians.

The song, which was heard only during a rain, is a single, metallic note, repeated at irregular intervals. We did not succeed in tracing the calling individuals.

Our specimens ranged in size from 24 to 32 mm. They vary from the type description in having a larger ear, 2/3 to 3/4 the size of the eye. A number of them were infested with what seemed to be parasites, especially under the thighs. Dr. Nelly Bosma has kindly examined these, and has found that they are mites.—HELEN T. GAIGE, *Museum of Zoology, University of Michigan, Ann Arbor, Michigan.*

ANOTHER RECORD OF *SCAPHIOPUS HOLBROOKII* FOR VIRGINIA.—On May 5, 1927, Mr. H. S. Peters and the writer captured a spadefoot toad, *Scaphiopus h. holbrookii* near the village of Onancock, Accomac County, Virginia. That night several pairs were found breeding in the ditch-pools beside the sandy roads. The single specimen captured is preserved in the Ohio State Museum. Dr. E. R. Dunn informs me that he knows of but one other record of this species for Virginia.—MILTON B. TRAUTMAN, *Ohio Division of Conservation, Columbus, O.*

Ichthyological Notes

THE OSTEOGLOSSID FISH *SCLEROPAGES* IN SIAM.—The osteoglossid genus *Scleropages* with two members has an ascribed range which embraces Sumatra, Banka and Borneo (*formosus*), and Queensland and New Guinea (*leichhardti*). There is nothing inherently surprising in the finding of *S. formosus* in Siam, where so many other fresh-water fishes of Sumatra and Borneo abound, but the fact remains that in the very considerable amount of collecting done in Siam in recent years this species had not been detected; and it not until 1931 that a boy scout, participating in a competition which I had arranged, exhibited a fine specimen of this fish as the basis for an original paper (to which a cash prize was awarded) on the occurrence, distribution, abundance, habits, etc., of the species in the district of Krat, Southeastern Siam. It is interesting to note that oral incubation, recorded in this fish by Fuhrmann in 1905, was described in the Siamese fish by the boy scout.

The adding of *Scleropages* to the fauna of Siam at the same time extends the distribution of the Osteoglossidae to the mainland of Asia.—HUGH M. SMITH, *Bangkok, Siam.*

A NEW NAME FOR A SIAMESE GOBY.—Mr. Carl L. Hubbs has kindly drawn my attention to the fact that the name *similis* which I recently applied to a new species of *Rhinogobius* from Siam[1] is preoccupied. I now recall that Gill, in 1859, described the genus *Rhinogobius* from Japan and made *similis* the type species. The Siamese fish may stand as *Rhinogobius* **simulans**, in allusion to its resemblance to *Rhinogobius caninus* (Cuvier and Valenciennes).—HUGH M. SMITH, *Bangkok, Siam.*

HERMAPHRODITISM IN THE STRIPED BASS.—An hermaphrodite striped bass, *Roccus saxatalis* (Walbaum) was sent to the author by Chas. Feller, Inc., of Marshfield, Oregon, on May 19, 1931. This specimen weighed 12 pounds, and had a standard length of 603 mm. The ovary was 21.5 cm. long and averaged between 2 and 3.5 cm. in diameter. The eggs were a little more than a millimeter in diameter. The two lobes of the testis were firmly joined to each other. They measured 25 cm. in length, and had a diameter of between 3 and 5 cm. A microscopical study of the testis indicated the presence of well developed spermatozoa. The ovary was located on the left side of the body cavity, the testis on the right. Undoubtedly this fish would have spawned both sexual products.—LEONARD P. SCHULTZ, *Department of Fisheries, University of Washington, Seattle, Washington.*

NOTE ON THE CUSK-EEL.—On the morning of May 16, 1931, S. K. Johnson of the College of Charleston found a cusk-eel, *Rissola marginata* (DeKay), on a mud-flat along the back beach of the Isle of Palms, near Charleston. When first noted the animal was a little over a foot from receding tide water and entirely concealed except for the head, which protruded vertically from the mud. It made no attempt to escape and was placed in a battery jar containing about one gallon of sea water.

For the most part the fish lay quietly on the bottom of the jar, usually on one side. When the fish was lying thus, there was noticed a slight undulating motion of the distal third of its body. Whenever an upright position was assumed, which was seldom, it seemed necessary for the fish to assume an S-shaped position in order to retain its balance. From time to time the fish would force itself backward very vigorously, with a vertical undulating motion which started at the head and progressed backward to the tail. This agrees with the statements of other observers that this fish moves backward in burying itself in sand or mud.

That this species must be very hardy seems borne out by the fact that this individual remained alive in a gallon of sea water for at least fifty hours. It was

[1] Descriptions of new genera and species of Siamese fishes. Proc. U. S. Nat. Mus., 79, 1931: 1-48.

then transferred to a gallon of fresh water, in which it lived a little over eight hours.

Judging from the few records of its occurrence, the cusk-eel is apparently not common on this coast. The specimen in question measures 165 mm. in total length.—E. B. CHAMBERLAIN, *Charleston Museum, Charleston, South Carolina.*

A NOTE ON SPAWNING ROSEFISH, *Sebastes marinus* (Linnaeus).[1]—While stationed at Fulton Fish Market, New York, during the spring of 1931 I chanced to look over a shipment of fish received from Boston on April 22. Included in this was a barrel of rosefish, which had been placed in small display baskets. A considerable number of larvae and eggs, on top of the fish in one basket, were apparently just released by the pressure of packing. My curiosity was thoroughly aroused upon seeing this and since the large female near the top seemed responsible for the presence of the larvae I scooped up as much of them as was possible to save and stripped the fish of many more which had remained in its ovaries. Another specimen, 380 mm. long (with caudal), contained many larvae which were preserved in formaldehyde, together with those previously collected. These larvae were from 5 to 7 mm. long. The late egg and free larval stages were in about equal number.

Rosefish are generally caught by small Italian boats, which fish with line trawls and small otter trawls in Massachusetts Bay and northward. Middle Bank and Jefferies Ledge are popular grounds for these boats and here the depth varies from 15 to 35 fathoms.

Since these fish were in the New York market April 22nd, they undoubtedly had been caught not earlier than the 15th nor later than the 20th. Therefore this seems to be an early record for gravid females and also for those with well developed free-running larvae, in the Gulf of Maine.

Bigelow and Welch in *Fishes of the Gulf of Maine* say this of the breeding habits of these fish: "It has long been known that this fish is viviparous . . . . It is not likely that any rosefish are born in the Gulf of Maine before late May, for we have found no gravid females or larvae prior to the end of that month. Breeding is evidently well underway in June." Previous authors have similarly described it as breeding from June to September off Massachusetts. In north European waters young rosefish are produced over a longer period, from mid-April through August, according to locality.

"Oceanographic conditions affect the breeding habits of this species and since the period of spawning is so brief, June to August, the lower limit at which the temperature may be set is from 37 to 39 degrees F. This is stated because in July, the height of the season, there is no colder water than this in the Gulf."[2]

Since writing this note I have received a letter from E. W. Bailey concerning a cruise of the *Albatross II* terminating at Boston April 30. He says " we trawled one day off Chatham and among the several rosefish which we took was one whose spawn was ripe and running. We hastened to get the eggs under the microscope . . . in almost every egg was a highly developed embryo whose heart movements we could clearly see. We preserved all these as we noticed that the fish was spawning almost a month before the time generally accepted for that cycle."

The temperatures off Chatham are in the neighborhood of 39.2° C.—F. E. FIRTH, *U. S. Bureau of Fisheries Laboratory, Fish Pier, Boston, Massachusetts.*

[1] Published by permission of the Bureau of Fisheries.
[2] Bigelow and Welch, loc. cit.

Abstract of Paper Read at the Philadelphia Meeting

ON THE ORGANIC EQUILIBRIA IN AQUARIA.—The producton of O_2 by the photosynthesis of plants in open balanced aquaria contributes little, if any, to that consumed by the animal life therein for the following reasons. As O_2 is nearly an ideal gas, an over or under saturation returns with extreme rapidity to equilibria as may be shown by a series of Winkler determinations. Consequently as photosynthesis goes on only part of the time and as there can be no accumulation of dissolved O_2, and as there is no evident change in the respiratory activity of fishes at night or on dark days, it follows that their chief source of O_2 is that invading through the surface film from the atmosphere. This is not to question the value of plants in reducing the CO_2 content because this latter gas evades and invades at a much slower rate. Further, it can be shown that where plants are active, dissolved CO_2 may remain far below its point of equilibrium for long periods. Therefore it is evident that in such aquaria the accumulated CO_2 is the limiting factor as regards the respiratory gases. This principle does not apply to hermetically sealed jars nor to such special conditions in which decomposition is so excessive as to produce what would be considered a disintegrating balanced aquarium.

The other effects of plants involving the nitrogen, phosphorus and sulphur cycles appear to be reasonably clear. The advantages of "old" water for small aquaria is partly associated with its larger buffer value. Such may be approached by the use of suitable buffer salts. It is demonstrably clear, however, that such buffering is not the entire cause of the value of "old" water. An active bacteriophage has been demonstrated to exist in both old aquaria water and the intestinal contents of fishes (*Micropterus dolomieu*). These demonstrations were made by the obtaining of plaques of lysis on ager plates from appropriate material. It was further shown that such phage was more virulent against foreign strains of bacteria than against the strains from the same aquaria in which it was living in a "host-parasite" relationship.

Bacterial counts of aquaria checked well with the above observations. A new aquarium showed a rapid climb in bacterial count above the tap water from which it was derived and a nearly equally rapid falling off to a point of stability. Ten aquaria differing in size, temperature and specimens, all showed a bacterial count in accordance with the time elapsed since establishment. After about 100 days equilibria was reached and the peak of bacterial activity appeared in the first week.

From this data the following inferences can be drawn. "Old" water having reached a state of bacteria-bacteriophage equilibria is in less danger of becoming foul. The occasional unaccountable fouling of an aquarium can be explained on the basis of the appearance of an unusually resistant strain of bacteria or the destruction of the phage. Work is at present under way to establish an active strain of bacteriophage for he purpose of innoculating aquaria which develop bacterial turbidity.—C. M. Breder, Jr., *New York Aquarium, New York City.*

EDITORIAL NOTES AND NEWS

Fourteenth Annual Meeting

THE fourteenth annual meeting of the American Society of Ichthyologists and Herpetologists was held at the Academy of Natural Sciences of Philadelphia, May 11 to 14, 1931. The members convened for informal discussion on the morning of May 11.

At 2:00 the session was called to order by President E. R. Dunn, with 21 members present. The following papers were read:

1. **Reptiles of Angola.** By Harold T. Green.—A running account of the reptiles observed on a recent Philadelphia Academy expedition to Africa, followed by motion pictures illustrative of the expedition.
2. **Records of the rare ocean sunfish, Masturus lanceolatus,** from Japan and Florida. By Carl L. Hubbs and Leonard Giovannoli.—An announcement of the discovery of this rare molid in Florida (for the first time except as adult in North America) and in Japan (for the first time). Illustrated by lantern. Discussed by Nichols, Fowler, Parr, Hubbs. To appear in COPEIA.
3. **The identification of American caecilians.** By E. R. Dunn.—A critical discussion of the classification of this group, and of the generic value of the characters used. Discussed by Wright and Nichols.
4. **Concerning a puzzling, variable group of Oriental carps, Lissochilichthys.** By J. T. Nichols.—An interpretation of generic value concepts in a group of Asiatic Barbus-like fishes, followed by a free-for-all discussion by Nichols, Parr, Wright, Dunn and Hubbs on the problems of generic splitting and of natural vs. convenient classifications.
5. **Good types of field labels.** By Clifford H. Pope.—A description of a good label stock and of methods of using this to insure the preservation of the field labels. Discussed by Greeley and Netting.
6. **Notes on the herpetology of the Miami area.** By R. F. Deckert (paper presented by M. K. Brady).—An account of the herpetological observations by Mr. Deckert about his home in Florida; discussed by Wright, Nichols, Dunn and Harper.

Four additional papers were introduced in the program by the Secretary.

7. **Remarks on a new genus of cyprinodonts from Nevada.** By Carl L. Hubbs.
8. **Remarks on cichlids collected in Africa by Loveridge, with an exhibition of specimens illustrating buccal gestation in Ectodus.** By N. A. Borodin.
9. **The regulation of the composition of the blood of teleost and elasmobranch fishes.** By Homer W. Smith.
10. **The evolution of the vertebrate kidney.** By Homer W. Smith.

One paper was read by title:

11. **Observations on the life-history of Ascaphus truei.** By G. K. Noble and Phillips G. Putnam.

Session of May 12

THE meeting adjourned to reconvene for the morning session of May 12, which was attended by 40. The reading of papers was then resumed.

12. **A possible addition to reptilian fauna of the Philadelphia region.** By Carl F. Kauffeld.—An account of the establishment of **Lacerta** near Philadelphia. Other introductions of reptiles and amphibians were recounted by Brady, Emlin, Leeds, Dunn and Hubbs. Mr. Kauffeld's paper will appear in COPEIA.
13. **A preliminary report on the herpetology of Pennsylvania.** By M. Graham Netting.—A discussion of the status and distribution of each species of reptile and batrachian in the state, illustrated by lantern slides. Discussed by Githens, Dunn, Netting, Wright and Burger.
14. **The early breeding habits of Ambystoma jeffersonianum in central Pennsylvania.** By Charles E. Mohr.—An account of observations of the depositing of spermatophores and other actions in the breeding of this salamander, illustrated by blackboard drawings. Discussed by Hubbs, Brady, Dunn and Wright. To appear in COPEIA.
15. **Habits of some Georgia reptiles and amphibians.** By Francis Harper.—A very interesting account of the habits of alligators, lizards, frogs and toads, illustrated by slides and motion pictures. Discussed by Wright and Dunn.
16. **Commercial herpetology.** By Clifford H. Pope.—A statement of the use for leather of snake, lizard and frog skins, illustrated by a large number of prepared skins. The discussion by Wright, Pope, Parr, Dunn, Brady and Netting mostly concerned the effects of commercial collecting of reptiles, for leather and souvenirs, on the natural supply.
17. **Comparative studies of the venoms of certain rattlesnakes.** By Dr. T. S. Githens.

One paper was read by title:

18. **Experiments on the egg-laying of salamanders.** By G. K. Noble and L. B. Richards.

Business Session

THE members, after again lunching at Bahl's, were called to order at 2:00, in business session, by the President, with 38 present. The report of the Secretary was read, and on motion by Nichols and second by Fowler, approved. The report of the Treasurer, covering the years 1930 and 1931 to May 5, was also read

and approved. Receipts for this period were given as $1971.12, distributed as follows: annual dues, $1198.15; contributions to Jordan Anniversary Number (from 64 members and 38 non-members), $451.65; subscriptions, $90.70; sale of back numbers, $120.62. Expenditures for the same period were given as $1635.01, allocated as follows: publication of COPEIA, $1281.03; printing of reprints, $80.00: stationery, 176.12; postage, $81.36; miscellaneous, $16.50. The balance as of May 5, 1931, was $336.11.

The question of an increase in the annual dues was introduced from the floor and freely discussed. The financial status of the journal was outlined by the Editor. On motion by Netting and second by Parr, the annual dues beginning with 1932 were fixed at $3.00, the Editor was authorized to make any arrangement he saw fit regarding discounts to agencies, and the Editors were given the approval of the Society on the editorial policies.

The matter of financial support for Biological Abstracts and Zoological Record came before the Society. The Secretary had communications and data from W. C. Curtis, J. R. Schramm, E. W. Gudger, George S. Myers and others, dealing *pro* and *con* with the advisability of supporting one or the other of these journals. It was, however, the pleasure of the Society, on motion by Nichols, to table the matter.

A communication from George S. Myers, Secretary of the Western Division, calling attention to the coming western meeting and inviting eastern members to participate, was read.

New Officers and Place of Meeting

THE report of the nominating committee was acted on favorably, and the following officers were elected for 1931-1932: *Honorary Presidents,* Leonhard Stejneger (Herpetology) and John Treadwell Nchols (Ichthyology); *President,* Emmett Reid Dunn; *Vice-Presidents,* G. K. Noble, William Converse Kendall and William M. Mann; *Secretary,* M. Graham Netting; *Treasurer,* Arthur Henn; *Ichthyological Editor,* Carl L. Hubbs; *Herpetological Editor,* Mrs. Helen T. Gaige.

The place of meeting was discussed at length, by Henn, Wright, Nichols, Dunn, Parr, and the Secretary, with especial reference to time and affiliation. It was unanimously agreed (motion by Wright) that the next meeting be held with the Mammalogists at Washington, in the Spring of 1932.

General Papers

FOLLOWING the business meeting, two general papers were presented:

19. The herpetological fauna of the Americas. By E. R. Dunn.—This interesting presentation, stressing the explanatory value of the northern center of radiative dispersal, was discussed by Hubbs, Netting, Parr and Nichols.
20. Portraits of the frogs of the United States. By A. H. Wright.—An illustrated talk indicating the scope and status of the author's forthcoming treatise on American anurans.

Annual Dinner

AT THE Annual Dinner,—an enjoyable party of 29 held on the evening of May 12 at Haverford College,—one other item of business was taken up. The "Resolution adopted at a meeting of nomenclature committees of scientific societies, at Washington, D. C., May 8, 1931", was introduced, discussed and approved in principle (motion by Hubbs, second by Netting). The President appointed a Nomenclature Committee of our Society, consisting of Hubbs (Chairman), Schmidt and Netting, and this committee by vote was given power to act in the name of the Society.

New Reptile House

WILLIAM M. MANN, Director of the National Zoological Park, was then called upon to describe the new Reptile House, the scene of our next annual meeting. Dr. Mann recalled that he, with Municipal Architect Harris of Washington, studied the chief reptile houses of Europe, visiting 20 zoos in 10 weeks, to obtain information requisite for the drawing up of plans for the biggest and best reptile

house of all, which was opened February 27 last. An essential feature of the new house is the providing of separate heating and ventilating systems for the public and the reptiles—adding to the comfort of each. In all there are 130 cages, varying from 8 inches long (for insects) to 80 feet long (for crocodilians); the largest cage is a bit of Florida Everglades transferred to Washington. Eighty-five foot lengths of Vita-glass and feeding of live food are thought to be responsible for the remarkable appetites, activity, reproductive propensities and viability of the reptiles exhibited. Many rare and attractive species are displayed.

Session of May 13

ON Wednesday morning, May 13, twenty-five members met at the Academy for the completion of the reading of the papers.

21. **Experience with a new type of filter for aquaria.** By Carl L. Hubbs and Laura C. Hubbs.—A discussion of the advantages of the new "Iron Trap Filter", especially on circulating systems.
22. **On the equilibria of aquatic environments, with especial reference to small aquaria.** By C. M. Breder, Jr.,—Abstract published in this number of COPEIA.
23. **Observations on the breeding behavior of brook trout and rainbow trout in some Michigan streams.** By John R. Greeley.
24. **The inheritance of naturally occurring variations in the Mexican platyfish.** By Myron Gordon.—An illustrated talk giving a summary of the speaker's interesting genetic studies.
25. **A fish collecting expedition to northeastern Mexico.** By Myron Gordon.—A running account, with views of the trip and of the fishes obtained.
26. **The freshwater fish fauna of northeastern Mexico.** By Carl L. Hubbs and Myron Gordon.—Read by title.

Excursions and Visits

A NUMBER of the members then proceeded to the Philadelphia Zoological Gardens, where a complimentary lunch was enjoyed, after which the zoo was inspected. Following this, the party was entertained, at the Philadelphia Aquarium, by the genial director Doctor Van Dusen.

On the same evening, the Society enjoyed meeting with The Pennsylvania Fish Culturist's Association, which prepared an especially fine exhibit and proved to the Society that Philadelphia is the greatest center of enthusiastic aquarists in America.

On May 14 several of the members remained to participate in the lunch and zoo inspection of the Mammalogists. The Antivenin Institute of America also opened its doors to the Society.

At the last regular meeting, the Society voted its sincere thanks to the several local societies and institutions which so hospitably received it and contributed so strongly to making the meeting outstandingly pleasant and profitable.

Third Meeting, Western Division

THE Third Annual Meeting of the Western Division of the American Society of Ichthyologists and Herpetologists convened in Culbertson Hall, California Institute of Technology, Pasadena, at 1:30 P.M., June 16, 1931. The following papers were presented.

1. **Some interesting herpetological and ichthyological discoveries.** George S. Myers, Stanford University. 15 min., slides.
2. **Notes on the embryology of the California anchovy.** Rolf L. Bolin, Hopkins Marine Station. 10 min.
3. **Notes on the salamanders of the genus Batrachoseps.** Berry Campbell, University of California, Southern Branch. By title.
4. **Some notes on steelhead trout.** J. O. Snyder, Stanford University. By title.
5. **Presentation of moving pictures of western rattlesnakes.** L. M. Klauber, San Diego Natural History Society. 30 min.
6. **The program of the California State Fisheries Laboratory in relation to the study and conservation of food fishes.** W. L. Scofield, California State Fisheries Laboratory. 10 min.
7. **The use of ova measurements in fisheries biology.** Frances N. Clark, California State Fisheries Laboratory. 20 min.
8. **Spawning of the California sardine.** E. C. Scofield, California State Fisheries Laboratory. 10 min.
9. **Discussion of current herpetological problems.** Led by Mr. L. M. Klauber.

After the program, a business session was held. The nominating committee presented the following nominees for the coming year: for president, Philip Pope, Walla Walla, Wash.; for vice-president, E. C. Scofield, San Pedro, Calif.; for secretary-treasurer, G. S. Myers, Stanford University, Calif. These were elected unanimously.

The meetings of the Pacific Division of the American Association for the Advancement of Science for 1932 will probably be held at Pullman, Washington, next June, and, following precedent, the Western Division should meet there. Certain members have suggested however, that since the Fifth Pacific Science Congress, with its great number of foreign delegates, will convene at Vancouver next May, it might be more fitting for our Western Division to meet at Vancouver at the same time. The secretary of the Western Division requests that members who would rather meet with the Pacific Congress than with the American Association communicate with him at once.

Exhibition of Western Reptiles

THE exhibition of living western reptiles accompanying the Pasadena meeting was an outstanding one, few of the Southwestern genera and species being absent. During the three days it was on view it was by far the finest and most popular of the many exhibits at the American Association Exhibition in Throop Hall. Much credit is due Dr. Sarah R. Atsatt for her efficient superintendence of the installation. The largest exhibit was that kindly brought by Mr. L. M. Klauber, the principal feature of which was a wonderful series of western rattlesnakes, as well as specimens of *Phyllorhynchus, Trimorphodon, Agkistrodon bilineatus,* and other rare forms. Others who contributed much were Charles Bogert, George Bendowski, Anita Daugherty, and David Michiner. Mr. Howard Hill's exhibit of fine casts of fishes from the Los Angeles Museum attracted much interest, as did Mr. Klauber's unrivalled series of rattlesnake portraits. G. S. Myers, with the permission of the California Academy, exhibited drawings of some strange new South American fishes obtained by the Ternetz Expedition in the Orinoco and Rio Negro.

Immigration and Investigation

MR. WILLIAM E. RICKER, graduate student in fisheries at the University of Toronto, was to have taken part in the New York Biological Survey this summer, but has been held up if not prevented from entering this country by immigration technicalities. The application of such national labor restrictions to scientific investigation, which by essence is international, justly incites condemnation.

The Use of the Word "Redd"

THE cleared gravel depositories for eggs which are used by many fishes are commonly known in America as "nests" or "beds", neither of which terms is very specific in its denotation. These clearings have a distinctive name "redd", which is used more in England and Canada than in the United States. This name has been applied chiefly to the egg-depositories of salmonoid fishes, but we suggest that it be used for all cleared gravel fish nests, as those of many petromyzonids, cyprinids and centrarchids, whether or not these are excavated or piled up. The two processes are so often associated as to make an nomenclatorial distinction difficult. The term "redd" could hardly be applied to the breeding home of those fishes which plaster their eggs on solid surfaces, or produce balls of eggs or definitely fabricated nests.

Fisheries Research News

DR. GEORGE C. EMBODY, of Cornell University, with the help of F. C. Taft and others, has started an intensive study of trout in California, for the Bureau of Fisheries in cooperation with the State of California. The study will involve: (1) an attempt to develop brood stock showing rapid growth, high egg production and resistance to disease; (2) the developing of methods for rearing the fish to a larger size, and (3) stream and stocking surveys.

Paul R. Needham has resigned his position with the University of Rochester and is now with the U. S. Bureau of Fisheries, working on bass propagation with

Charles O. Hayford at the Hackettstown fish hatchery. His present address is 412 Plane Street, Hackettstown, New Jersey.

We learn from the *Fisheries Service Bulletin* further that the International Commission for the Investigation of Passamaquoddy Fisheries is now active, and that vessels have been provided to further the Mississippi shellfish investigations (under Prof. M. M. Ellis) and the Louisiana shrimp invesigations (under Prof. Frank W. Weymouth).

The ship *Atlantis*, which has just been built in Denmark for the Woods Hole Oceanographic Institution, is assigned to scientific exploration on its maiden voyage across the ocean. Besides physical, chemical and plankton studies, attention will be paid to the collecting of fishes that swim at great depths.

Fisheries Work at University of Washington

DR. JAMES ERIC LYNCH has been appointed Associate Professor in the Department of Fisheries at the University of Washington. The staff and students of that department have organized the *Gilbert Fisheries Society*, named in honor of the late Charles Henry Gilbert. The object of the society is to promote interest in fisheries research and to bring fisheries investigators and administrators into contact with the local group.

The Bureau of Fisheries Laboratory at Seattle, which is associated with the University of Washington, is being occupied this summer. This splendid building, which cost $105,000, is said to be constructed in a manner designed to greatly facilitate research. The laboratory, under the direction of Joseph A. Craig, will serve as headquarters for investigations on Pacific salmon, herring and shell-fish resources. It will also house the International Fisheries Commission, which under a renewed treaty is continuing the intensive investigation of the halibut—by Dr. William F. Thompson and his corps of assistants.

Ichthyological Items

SAMUEL F. HILDEBRAND, until recently Director of the Beaufort Fisheries Laboratory, has been assigned to the Washington office, where he will be largely freed from routine executive work to devote a larger share of his time to ichthyological investigations. Dr. H. F. Prytherch, who has been engaged in oyster culture studies for the Bureau for several years, has taken over the direction of the Beaufort laboratory.

Dr. Albert W. Herre writes from the Philippines that his fish collecting is satisfactorily under way. He has just moved to Dumaguete, and later will proceed to Lanao.

Prof. Peter J. Schmidt has resigned his position as Curator of Fishes in the Museum of the Academy of Sciences of the U.S.S.R. at Leningrad, and is working on the flatfishes of Barents Sea. His place is taken by his former assistant, Dr. A. Popov. Both of these ichthyologists are members of the American Society of Ichthyologists and Herpetologists.

Leonard P. Schultz, of the University of Washington, and one of his students, Allan De Lacy, are spending the summer at the University of Michigan working on Oregon and Washington fishes.

Herpetological Items

TWO more of the state herpetologies are to be revised. Roger Conant, Educational Director of the Toledo Zoological Society, has under way a report upon the Ohio reptiles, and Charles Walker, of the Ohio State Museum, has been working for some time on the amphibians of Ohio. Albert Heinze, of St. Louis, has been making a study of the reptile fauna of Missouri, with the anticipation of bringing up to date Hurter's "Herpetology of Missouri".

Dr. Gordon L. Walls will continue his research on the reptilian retina next year, under a Lloyd Fellowship, at the Museum of Zoology of the University of Michigan.

He will greatly appreciate live specimens of opisthoglyph snakes for use in his investigations.

Dr. Charles E. Burt has resigned his position at Trinity University, Waxahachie, Texas, and has accepted the headship of the Department of Biology of Southwestern College, Winfield, Kansas.

W. D. Weller, of Cincinnati, was instantly killed in a fall from a cliff at Linville, while engaged in collecting salamanders. He had already, as a high school student, collected several times in the Carolinas, and described two new salamanders. Mr. Weller was to have entered Haverford College next year to study under Dr. Dunn. The death of this extraordinarily promising lad was indeed tragic.

Monographs on Chinese Cold-blooded Vertebrates

THE American Museum has announced the preparation of the final reports of its Central Asiatic Expeditions, in twelve volumes. Of these, Vol. IX is scheduled for "The Fishes of China", being prepared by J. T. Nichols, and Vol X., "The Reptiles of China", by K. P. Schmidt and C. H. Pope.

Correction

THE note on "Suckers eating trout spawn at night", in COPEIA, 1930, No. 4, was by some editorial slip attributed to Francis K. Barbour. The author's name should have been given as Frederick K. Barbour.